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# **Science & Technology**

***Central Eurasia:  
Life Sciences***

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# Science & Technology

## Central Eurasia: Life Sciences

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**BME 361 I—a New Site-Specific Type II Deoxyribonuclease From *Bacillus megaterium* 361**  
927C0497A Moscow PRIKLADNAYA BIOKHIMIYA I  
MIKROBIOLOGIYA in Russian Vol 28 No 2, Mar-Apr  
92 (manuscript received 7 Aug 90) pp 173-177

[Article by L.R. Lebedev, I.S. Andreyeva, G.D. Serov, L.Ya. Denisova, and N.M. Pustoshilov, Scientific Research and Technological Design Institute of Biologically Active Materials, Vektor Scientific Research Association, Berdsk, Novosibirsk Oblast; UDC 577.152.314'14]

[Abstract] The authors of the study reported herein have isolated a new site-specific type II deoxyribonuclease from the soil microorganism *Bacillus megaterium* 361. The new deoxyribonuclease, which has been named BME 361 I, is a restriction endonuclease that is capable of recognizing and cleaving the nucleotide sequence GG<sup>1</sup>CC in double-strand DNA. BME 361 I has been deposited at the All-Union Scientific Research Institute of Genetics under the number V04723. The biomass was grown during thermostatted rocking for 24 hours at a temperature of 30° and with a rotation speed of 220 to 240 rpm. After the mixture was cooled, the cells were collected by centrifugation at 6,000 rpm and stored at -20° until use. The enzyme was purified at 4°. For 20 minutes, a quantity of 0.5 g cells was suspended in 10 ml of buffer A (0.1 M tris-HCl with a pH of 8.0, 10 mM 2-mercaptoethanol, 0.1 percent Triton X-100, and 1 mg/mg lysozyme). The resultant spheroplasts were fractured on an MSE (Great Britain) ultrasonic disintegrator. The cell fragments were then removed by centrifugation at 18,000 rpm for 40 minutes (in a Beckman J-21B centrifuge with a JA-20 rotor), and the packed fluid was applied to a column (1 x 5 cm) with P 11 phosphocellulose balanced with buffer B (10 mM KH<sub>2</sub>PO<sub>4</sub> with a pH of 7.4 and 10 mM 2-mercaptoethanol) at a rate of 10 ml/h. The column was washed with 5 ml of buffer B, and the sorbed proteins were eluted with a linear NaCl concentration gradient of 0 to 1 M in the same buffer. The elution rate was 10 ml/h. Fractions of 1 ml each were collected and analyzed for their restrictase content by sampling of aliquots of 2 to 3 µl each. Those fractions with restrictase activity were pooled and dialyzed for three hours against 200 ml buffer B, and the dialyzed solution was applied to a column (0.8 x 2.0 cm) with hydroxyapatite (balanced with the same buffer) at a rate of 2 ml/h. The column was washed with two ml of buffer B, and the sorbed proteins were eluted with a linear KH<sub>2</sub>PO<sub>4</sub> concentration gradient of 0.01 to 0.80 M in buffer B at an elution rate of four ml per hour. Fractions of 0.5 ml each were collected and analyzed for their restrictase content by sampling aliquots of 1 µl each. Those fractions that contained the target enzyme were pooled and dialyzed against 100 ml of buffer C (10 mM tris-HCl with a pH of 7.4, 10 mM 2-mercaptoethanol, 50 mM NaCl, and 50 percent glycerol) for 16 hours. The resultant enzyme preparation was stored at -20°. The enzyme's activity was determined by incubation at 37° for one hour in 25 µl of reaction

mixture containing 10 mM tris-HCl with a pH of 8.0, 10 mM MgCl<sub>2</sub>, 50 mM NaCl, and 1 µg DNA phage λ in 1.4 percent agarose gel. The reaction products were subjected to electrophoresis in 1.4 percent agarose gel. The minimum amount of enzyme required for total specific cleavage of 1 µg DNA phage λ under the specified conditions was adopted as a unit of enzyme activity. The BME 361 I restrictase isolated was demonstrated to cleave DNA phage λ at more than 100 sites and DNA plasmid pBR 322 at more than 10 sites. A comparison of the study published data regarding restrictase specificity demonstrated that the nucleotide sequence GG<sup>1</sup>CC is the likely site of enzyme recognition. This hypothesis was confirmed by simultaneous and parallel hydrolysis of DNA phage λ by the known restrictases Hae III and BME 361 I. The patterns of the two restrictases were found to be identical, thus enabling the researchers to conclude that BME 361 I is a true isoschizomer of the restrictase Hae III. The new strain is more productive than those described in the literature. Figures 3, table 1; references 7: 2 Russian, 5 Western.

**Purification and Selected Properties of the NAD-Dependent Methanol Dehydrogenase of the Heat-Tolerant Methylophil *Bacillus methylothermophilus***

927C0497B Moscow PRIKLADNAYA BIOKHIMIYA I  
MIKROBIOLOGIYA in Russian Vol 28 No 2, Mar-Apr  
92 (manuscript received 22 Oct 90) pp 184-191

[Article by A.P. Sokolov, L.L. Belova, and Yu.A. Trotsenko, Institute of the Biochemistry and Physiology of Microorganisms, Russian Academy of Sciences, Pushchino; UDC 577.15.072]

[Abstract] NAD-dependent methanol dehydrogenase [NAD-MDH] of the heat-tolerant methylophil *Bacillus methylothermophilus* was subjected to 26x purification in a procedure that involved fractionation of the crude extract with ammonium sulfate and chromatography on the immobilized textile dye Active Black K and diethylaminoethyl [DEAE]-Sephacrose. Specifically, the extract that had already been subjected to fractionation by ammonium sulfate was dialyzed against a buffer of 50 mM tris-HCl with a pH of 7.5, 5 mM MgCl<sub>2</sub>, and 4 mM dithiothreitol [DTT] and applied to Sepharose CL-6B dyed with Active Black K, which specifically bound the NAD-MDH. Some unknown inhibitor was evidently removed by this step because the enzyme yield after this stage of the purification process amounted to 133 percent. Next, those fractions with formaldehyde reductase activity were pooled in the amount of 15 ml, salted out by ammonium sulfate (70 percent of saturation), dialyzed against the aforesaid buffer, and applied to a column with DEAE-Sephacrose balanced with the same buffer. The enzyme was eluted from the DEAE-Sephacrose with a KCl concentration of about 300 mM. This stage produced a purified NAD-MDH preparation, but with a yield of just 22 percent. The formaldehyde reductase activity remained unchanged after two days of storage at -20°. After only three hours at 0°, however, its

activity dropped by half. The new procedure resulted in NAD-MDH with a purification of 26x with respect to its formaldehyde reductase activity. Its methanol dehydrogenase activity was almost completely (98 percent) lost, while 22 percent of its formaldehyde reductase activity was maintained. A cell-free extract of *Bacillus methylothermophilus* M11 was demonstrated to restore the ability of the purified NAD-MDH to oxidize methanol. When the said extract was added to an NAD-MDH fraction having only formaldehyde reductase activity, the fraction's ability to oxidize methanol increased nearly 20-fold. A modified saturation effect was also observed: Saturation was observed to begin at an NAD-MDH:modifier ratio of 1:4-6. Regulation of NAD-MDH activity was thus shown to occur at the level of protein-protein interaction and possibly at the level of expression of the protein-modifier gene. The  $K_m$  of the purified enzyme for methanol, formaldehyde, and NAD were determined to be 28.4, 7.2, and 0.27 mM, respectively. The results of the study reported herein were found to be consistent with published data from a study of NAD-MDH of the heat-tolerant methylotroph *Bacillus* sp. C1. Figures 3, table 1; references 25 (Western).

#### Effect of Physiologically Active Polymers on the Activity and Hormonal Induction of Tyrosine Aminotransferase

927C0512A Moscow VOPROSY MEDITSINSKOY  
KHIMII in Russian Vol 38 No 1, Jan-Feb 92  
(manuscript received 4 Jun 90) pp 21-22

[Article by L.V. Goncharova, I.Yu. Galayev, and V.I. Shumskiy, Volgograd Medical Institute; UDC 612.015.2:577.152.2]0.14.46.08]

[Abstract] Physiologically active polymers may serve as the foundation for drugs with preplanned characteristics. In view of this fact, the authors of the study reported herein examined the effect of physiologically active polymers on the activity and hormonal induction of tyrosine aminotransferase [TAT]. Specifically, they studied the effect of six different physiologically active polymers on the activity and hormonal induction of TAT of the livers of a group of 195 mice weighing between 18 and 20 g each. Five of the physiologically active polymers studied were synthetic: polyvinyl alcohol (molecular mass, 72,000); polyvinyl methylacetamide (molecular mass, 25,000 to 30,000); polyvinyl pyrrolidone (molecular mass, 35,000) (designated PVP<sub>1</sub>); polyvinyl pyrrolidone (molecular mass, 100,000) (designated PVP<sub>2</sub>); and polyvinyl caprolactam (molecular mass, 117,000). Dextran (molecular mass, 15,000 to 20,000) was also used. Three series of experiments were performed. In the first series, the researchers studied the effect of the study polymers on the basal activity of TAT. In the second series, they studied the effect of preliminary injection of the study polymers on enzyme induction by hydrocortisone. In the third series, they studied the effect of the six polymers on TAT induction when they were injected simultaneously with hydrocortisone.

Enzyme activity was determined four hours after injection in each of the series of experiments. TAT activity was determined in accordance with a method published elsewhere and expressed in micrograms of parahydroxyphenylpyruvate formed after one hour of incubation at a temperature of 37°C on one g of protein. The proteins were determined by spectrophotometry at a wavelength of 200 nm. Five of the six physiologically active polymers tested reduced TAT activity in the study mice. The polyvinyl pyrrolidone with a molecular mass of 35,000 (PVP<sub>1</sub>) had the most pronounced effect. Polyvinyl caprolactam had the opposite effect: When injected into the study mice, it caused TAT activity to increase to approximately double the basal level. The only chemical difference between the polyvinyl caprolactam and polyvinyl pyrrolidone (PVP<sub>1</sub>) is that the former has two additional methylene groups in its lactam ring, which gives it greater hydrophobicity. The researchers concluded that this chemical distinction is enough to change its physiologic effect—probably because of interaction of the polymer with the elements of the cell membranes. The researchers hypothesized that thanks to its hydrophobicity, polyvinyl caprolactam is implanted into the hepatocyte membranes, thus making it easier for endogenous steroids to penetrate them. The more hydrophilic polymers, on the other hand, reduce hydrocortisone's ability to penetrate the cells. Injection of hydrocortisone one hour after injection of the physiologically active polymer (i.e., in the second series of experiments) caused a decrease in hormonal induction of the enzyme. In the third series of experiments all of the study polymers were found to intensify hormonal induction. The experiments performed thus confirmed that neutral polymers with nonspecific activity are not biologically inert but rather may, upon injection into the body, interact with both the structural elements of cells and the compounds present in biological fluids. The complexing action of polymers in relation to steroidal hormones may be used in clinical practice to prolong their effect and thus permit significant dose reductions. Figures 2; references 7: 5 Russian, 2 Western.

#### Structural-Functional Dependence of the Physiological Responses of Vasopressin and Its Analogues on the Hemostasis System

927C0512B Moscow VOPROSY MEDITSINSKOY  
KHIMII in Russian Vol 38 No 1, Jan-Feb 92  
(manuscript received 14 Aug 90) pp 42-44

[Article by M.G. Golubeva, T.M. Kalishevskaya, and M.Ye. Solovyeva, Moscow University imeni M.V. Lomonosov; UDC 615.357:577.175.343]0.15.4:616.151.5]0.76.9]

[Abstract] The use of vasopressin to correct various impairments in the hemostasis system is limited by its pressor and antidiuretic action, as well as by its significant intensification of fibrinolysis due to an increase in plasminogen activator levels. Both vasopressin and its analogue 1-des-amino-8d-arginyl-vasopressin are plagued by these problems. The vasopressin analogue

des-glycyl-amide-arginyl-vasopressin, which is totally free of hormonal activity, is free of these problems, however. In view of these facts, the authors of the study reported herein conducted a series of experiments aimed at finding the most effective vasopressin analogues and fragments for directed correction of different impairments in the hemostasis system. The experiments were performed on mixed-breed rats weighing between 180 and 200 g. The rats were administered intravenous injections of six vasopressin analogues, and fragments

were tested. The studies performed confirmed that modification of the amino acid sequence in the vasopressin molecule results in distinct alterations in its main peptide properties. The presence of a ring structure in the peptide molecule appeared to be mandatory for an increase in the amount of factor VIII in the blood, whereas the absence of glycine in the side chain was found to cause a decrease in the fibrinolysis rate and plasminogen activator activity. Figures 2; references 17: 5 Russian, 12 Western.

### TV Visits Secret Nuclear Test Hospital in Kazakhstan

AU1208114792 Mainz ZDF Television Network  
in German 2010 GMT 11 Aug 92

[Report by Minette von Krosigk and Joerg Apfelbach: "Radioactivity—the Fateful Silence; Kazakhstan's Secret Hospital Opens Its Archives"; a 46-minute report]

[Editorial Report] The German television team visited Hospital No. 4 in Semipalatinsk, which was established by the military in 1961 and where doctors secretly examined thousands of people to see the effects of nuclear tests on people's health. The reporter says that over the past 40 years "almost 500 nuclear tests" took place in the area, "more than 100 bombs were detonated above ground, before the eyes of the defenseless population." About 1 million people reportedly live in the area surrounding the nuclear test site.

In 1990 the hospital officially ceased its examinations. The German reporters were the "very first" outsiders permitted to visit the hospital. Now it is called "Kazakh Institute for Radiology and Ecology," but the director remained the same, Dr. Boris Ivanovich Gusev. The reporter notes that more than 30,000 reports on patients and about 40,000 samples are stored in the hospital archives. The annual research reports, which are still top secret, are kept in safes.

Director Gusev is shown presenting to the journalists a map of radioactive contamination and noting that it is the "very first time" that this map has been shown to journalists. Illustrating his explanations with the map, Gusev says: "This map was drawn up as early as in 1963, but it has never been accessible to the general public, neither the public abroad nor the mass media or the doctors in our country. As I have told you, this map shows the nine most important and strongest explosions, which took place between 1949 and 1963. The 1949 explosion was the first one. It took place on 29 August. The bomb that was exploded on the test site had a capacity of 18 to 20 kilotons. The wind blew northeast. As a result of immense low cloud, enormously large territories were contaminated by radioactive fallout. These included the territory of the Altai district, the area of Semipalatinsk, and eastern Kazakhstan. The levels were so high that they were comparable to the actual conditions of a nuclear war, a real nuclear war. According to our calculations, the explosion of 1949 alone contaminated at least 100,000 people."

The reporter goes on to describe how the patients were examined. Diagnoses were told neither to the patient nor to his doctor, but "served exclusively military and scientific interests. Even when the disastrous effects of the nuclear tests on the population became obvious, the reports remained secret and the hospital kept collecting data as usual."

Gusev is shown pointing out files of patients who live very close to the site of the tests, and describing their

illnesses. The reporter notes that there are "still no exact statistics" of deaths among these people.

The television team then visits various highly contaminated villages to talk to eye-witnesses of the explosion. The most affected places are Kuchatov, which is "practically inaccessible," Moystik, Dolon, Chereomushkiy, Sarshall, and Kainar.

The journalists, accompanied by Gusev, visit Moystik, Chereomushkiy, Sarshall, and Kainar, where they are shown severely handicapped children, whose handicaps are reportedly due to radioactive contamination of their parents. During the first visit, to Moystik, Gusev stresses that the severely mentally and physically handicapped boy they see there is "certainly not an isolated case." "One can assume with 100-percent certainty that this is the effect of the ionizing radiation on the mother's organism."

The reporter notes that "according to the hospital's statistical research, hereditary diseases due to radiation damage to the chromosomes are about 3.5 times as frequent in the contaminated areas as among the normal population far away from the test site. Dr. Gusev's statistics, which have so far not been permitted to be published, also prove severe damage to the health of adults. The life span among the contaminated people is clearly shorter. In the contaminated areas, twice as many people suffer from high blood pressure and heart attacks than in areas far away from the test site. The immune system is considerably weaker. Infectious diseases are increasing, and the incidence of tuberculosis is rising. Over the past 20 years there have been more cases of cancer, and benign tumors are also found quite often."

In Kainar the journalists visit the district hospital, where, it is said, there is a lack of personnel, equipment, and pharmaceuticals, and as a result the medical treatment is reportedly deficient. The hospital is responsible for the medical treatment of 10,000 people, even though it is designed only to deal with a catchment area of 3,000 people. The reporter notes that "according to the unanimous statements of the doctors, the general state of health of the people is deteriorating." It is noted that fatalities among babies and children are increasing. Soil samples of the area reportedly show 2,000 times higher radioactivity than normal.

The journalists then talk to a former radio operator at the nuclear test sites, who now works as a shepherd because he has been sick since 1956. The man says that the doctors have always played down his sickness, he does not receive treatment or financial support, and his family is also sick.

There follow various eye-witness reports of nuclear tests with interspersed film clips of such tests.

The report continues with shots taken again at Hospital Nr. 4, where Gusev shows a radiometer that indicates radioactivity in the air. He describes the procedures in case of alarm, but points out that the equipment did not



yet exist when nuclear tests were made above ground, because the building was not yet there. Gusev shows samples that were tested for radioactivity. The reporter notes that all kinds of substances were tested and can still be found on the shelves; Gusev explains how these tests were carried out by showing the various pieces of equipment used. The data was top secret and only available to the Army and to the government in Moscow, it is pointed out.

Then Gusev opens a safe to show medical reports, which, according to him, have never been shown to anyone apart from those who ordered them. He shows several of these reports and explains their purpose. The author of the first major report in 1958, Dr. Saym Balmukhanov, confirms the authenticity of his report, which he now sees for the first time since he wrote it, and describes his work at that time. Subsequently, Gusev describes Balmukhanov's report, noting that the report went to Moscow, and the government decided that Balmukhanov was wrong because the result was so negative. Another expedition was sent and the Moscow report of 1960 contradicted Balmukhanov's report.

The journalists then visit the collection of the medical museum in Semipalatinsk, where deformed fetuses with, for example, two heads or only one eye are conserved. The director of the children's hospital in Semipalatinsk is interviewed and says that such deformities should be diagnosed before birth and that the institute should concentrate on examining the groups that are most at risk.

Children with severe sicknesses are shown in the hospital. The director notes that the state of health of children in this district is deteriorating. A chronic weakening of the immune system, the so-called "nuclear AIDS," is becoming increasingly common.

The cemetery in Semipalatinsk is then shown, where many graves of young children and of adults who died relatively young can be seen.

The report concludes with scenes of a wedding, of babies in the Semipalatinsk hospital, and of an old man, who describes how much of Kazakhstan has been destroyed.

**Krasnoufimsk Illnesses Linked to Radioactive Ore**  
92WN0689A Moscow MOSCOW NEWS in English  
No 28, 12-19 Jul 92 pp 10-11

[Article by Vadim Chelikov: "Forgotten Menace"—first paragraph is MOSCOW NEWS introduction]

[Text] Year after year, those university students traditionally detailed for "emergency" farm work who happened to be working near Krasnoufimsk, Sverdlovsk Region, were hit by a mysterious disease. The press had advanced several hypotheses as to the origin of the disease before a sensational revelation arrived: the European-Asian News Agency reported that scientists

believed the real culprit was thoron, a gaseous by-product of the radioactive decay of thorium.

#### Out-of-Bounds Zone

A radiometer held by Gennady Alyabishev, deputy chief of administration of the Krasnoufimsk District, displayed the radiation intensity as 1,500 micro-roentgen/hour, and its digital indicator showed 6,000 (maximal tolerable exposure is three minutes) right outside the storehouse.

The wooden stovehouses were built in 1941 for storing grain and sugar. The builders were local camp inmates whose remains are perhaps rotting away in the neighbouring bog. Back in 1960, all 24 storehouses were suddenly vacated of grain. Replacement materials—auburn sand in sacks—were rushed in. Men were unloading the 50-kilogram sacks from railway cars and carrying the sacks in on their backs. People arrested for minor offences and sentenced for 15-day forced labour were sent in to help. The grain was loaded into the emptying cars. Men were walking on sand barefoot, and sitting on it during snack breaks.

Waybills identifying the sand as 82,000 tons of monocyte ore containing 2-6 percent of thorium-232 arrived only six years later! That discovery made the local authorities introduce an out-of-bounds zone around the storehouses. In 1986, the Pobeda Integrated Stores which own the storehouses (and are part of the Russian Federation state reserves system) cut the number of wardens sevenfold, down to merely four old men. Soon thereafter, the roof of one of the stores went down sending out quantities of radioactive dust. In December 1989, there was a narrow escape from a Chernobyl-size catastrophe when a railway car with ammonium nitrate caught fire while entering the neighbouring storage of agricultural fertilizers. Luckily, a worker put on a rail shoe. The 1,500 tons of ammonium nitrate already stored there could have exploded in an immense bang which would have dispersed thousands of tons of radioactive ore over vast expanses.

#### Korean Gift?

What was the origin of the ore? Why was it brought in? According to unofficial information, it was delivered from Korea, allegedly for the production of uranium fuel. However, the plan was abandoned because of the high cost of ore-enrichment technology or due to the discovery of uranium-ore deposits in the USSR itself. According to Alexei Babayev, Chief Engineer of the Pobeda Integrated Stores, the decision to hand the sand over to the Main Department for the Material Reserves of the USSR for long-term storage was made at the top of the state management, ignoring the fact that Pobeda was designed to store food only and did not have experts for work with radioactive materials.

Deputy Chief State Sanitary Inspector Zalikin in a classified message informed the Krasnoufimsk sanitary inspectorate about the arrival of radioactive cargo. Local

sanitary inspectors were alarmed and filed an inquiry with the Russian Federation Public Health Ministry. The Ministry gave its approval only four months later, after a lot of the radioactive sand had been brought in and stored already. The regional sanitary inspectorate sanctioned stalling of the work on depositing the ore in April 1961. The Ministry banged its fist on the table and confirmed its authorization of storage of the ore there. The same letter from the Ministry sanctioned (for the purpose of quieting down local people's protest) the introduction of a 600-metre-deep out-of-bounds area (exactly the distance from the nearest village). About 200 residents of a small worker settlement inside that area were to be resettled (which was finally done five years late).

The sanitary inspectors were discouraged from further intractability. Since then, the inspectors have been clearing locally-produced food (water, milk, bread, etc.) for consumption, cautiously reporting that "in terms of content of uranium and thorium, the food is only insignificantly different from before" and that "there's been no breach of regulations in the operation of the store-houses," noting that "the effect of radiation on environment hasn't been registered beyond 300 metres from the stores."

In the meantime, the stores were rotting away, as trains were passing only 100 metres away, carrying not only passengers but also easily flammable and explosive cargoes on the Moscow-Vladivostok route. Neighbouring fertilizer storages kept expanding even nearer to the Pobeda stores. But the situation at the ore-dressing integrated works in Ozyorny (where the ore was enriched before storage) was the greatest outrage of all: Sanitary inspectors were not allowed there at all, while the radioactive sand was routinely used by local people in building practices, for facing paths and in children's sandboxes. After the status of a security-sensitive installation was removed from the Ozyorny Integrated Works, many local houses revealed such high levels of radioactivity that simple radiometers could not register its extent. In contradiction to the resettlement decision, people continue to live in their old houses, since the local authorities have no money to spare for new housing development.

#### Classified

In 1989, the environment-conscious Greens and common Krasnoufimsk residents demanded the removal of the sand away from the Sverdlovsk Region. Their protest forced the Department for Material Reserves into action. The All-Union R&D Institute for Industrial Technologies carried out a detailed study of the influence of the objects in Krasnoufimsk on the natural environment. The study revealed that the Public Health

Ministry's approval of the storage of the radioactive sand was not based on any scientific justification whatsoever. Gases from thorium—thoron and its byproducts—proved to be the most perilous factor there.

From classified conclusions of the Institute's experts: "Inhaled byproducts of decomposition of thoron found inside the stores and up to 700 metres away pose the gravest danger." The concentration of the said decomposition byproducts is 70 times greater than the tolerance level. Personnel should not be allowed to be inside for more than 40 minutes and within "600 metres from the stores for more than three hours daily."

Panic spread around Krasnoufimsk. Enterprises and higher schools severed whatever agreements they had with the local collective farm. The Greens warn that they will block the passage of railway trains with their bodies unless the sand starts to be taken away.

However, Nikolai Romanov, Chief Academic Secretary of the Ural Department of the Russian Academy of Sciences, believes that there is no sufficient ground to blame the students' illness on the thorium.

#### Until Better Times?

The Institute has developed nine different options to solve the problem caused by the radioactive sand. True, the majority of the variants are impossible. It was proposed to have the stores buried under artificial hills and forget about them until a better solution crops up. But the gas would continue to seep away nonetheless, and local people are not happy about this prospect. In an alternative variant, the sand is to be put in iron cases and buried in abandoned mines. However this would mean moving 90 trainloads. Besides, a worker can't be allowed to be exposed to the radiation emanating from the sand for more than two and half hours a month.

There is a more practical solution, however. The concentrated ore contains up to 50 percent of rare-earth elements: europium, scandium, and lutecium. Even with vastly lower prices, a ton of that sand costs as much as 60,000 roubles. Business entrepreneurs from the Baltics are offering to take away the sand (but return the thorium). To every appearance, Russia itself might think again about this source of rare-earth elements, since the natural deposits of the above are in Kazakhstan.

Nuclear power experts believe that industrial systems (reactors in NPPs and nuclear ice breakers) using thorium can be much safer than ones using uranium for fuel. Unfortunately, this country, according to the Ministry of Nuclear Power Generating Industry, is not designing or developing thorium-fuelled systems, so that thorium will remain unwanted for at least 50 to 70 years to come. But what about removing the menace to Krasnoufimsk?

**Interdepartment Meeting on AIDS in Minsk**  
*927C0473A Minsk ZDRAVOOKHRANENIYE*  
*BELOURUSSII in Russian No 9, Sep 91 pp 68-70*

[Article by N. K. Deryugo and S. N. Dunay; UDC 616.98:612.017.1]-084:061.3 (476): "A Mercedes Is Worth a Few AIDS Cases!"]

[Excerpts] An interdepartmental conference on the pressing problems of AIDS prevention in the republic was held in Minsk on 12 June 1991. In his introductory remarks G. D. Galinovskiy, chief of the Administration for Affairs of the Sociocultural Complex, noted that AIDS reached Byelarus five years ago and that 59 infected patients, including 21 residents of the republic, were revealed in the republic as of today. Because AIDS is a universal problem that has gone beyond the competency of public health organs, the republic's council of ministers decided to raise this issue for discussion and turn the attention of executives of all organizations, ministries, plants and, factories to the fact that the epidemic of the 20th century has now reached us and that we must seek possible financial (including hard currency) resources with which to help the BSSR Ministry of Health to acquire the laboratory equipment needed to reveal HIV carriers and patients in the republic's population. [passage omitted]

As far as our republic is concerned, in the first half of this year AIDS was detected in 63 persons, to include 24 indigenous residents of the republic (four children, nine men, and 11 women). As of 12 June 1991 there are cases of AIDS virus carriers in all of the republic's administrative territories. Thus, while in 1987 only two cases of HIV positive individuals were recorded, in five years the number of patients increased tenfold, and in five months of 1991, the AIDS virus was detected in another four persons.

Such swift spread of infection must get the attention not only of public health organs, but also education organs, other departments, and finally the Soviet government (both local administrations and supreme organs).

BSSR Deputy Minister of Health V. P. Filonov, chairman of the Republic AIDS Control Committee, emphasized that the AIDS problem cannot be handled by public health workers alone. Solution of this problem must be on a state basis, as is done in all civilized countries of the world. In Spain, Portugal, Germany, and Italy, these problems are being dealt with by cabinets of ministers, in which special AIDS control committees have been established. In the United States, the AIDS control program is headed by the president of the country, while in England it is headed by the prime minister. Nongovernment organizations and some of the largest companies like General Motors, Bank of America, and others are also providing help in these countries. An active effort is also being made to publicize AIDS prevention measures, and booklets and other informative materials are being published.

In our republic, AIDS prevention work is only just beginning, and for the moment only medical workers are working on the problem. While in 1987 the first reports of AIDS led to a sharp decrease in the incidence of syphilis and gonorrhea, by 1990 the fear died down, and the incidence of syphilis doubled; moreover in the first three months of 1991 it increased by 32.8 percent. A survey of youngsters in institutes, secondary schools, and vocational-technical schools conducted by the Republic Center for AIDS Prevention and Control revealed that around 40 percent of young men and a slightly smaller percentage of girls have an active sex life at an age of 15-16 years. Evidence of this is found in the fact that abortions were carried out in the republic among 573 juveniles in 1989 and 832 in 1990. Here is another fact: The first HIV positive person in the republic became sexually active at an age of 13 years, and she had her first child at 14 years.

Considering the survey results, preventive work must be started in nursery school, instilling in the children a sensible and good idea about sex relations, and not after the children have obtained their sex education in backyards, basements, and attics. Educators must work together with medical workers on the problems of sex education and morality. Unfortunately all good initiatives of medical personnel are being met by the fixed bayonets of school teacher collectives and oblast and rayon executives. For example, when medical workers proposed introducing AIDS prevention among schoolchildren, the proposal was quickly buried by executives of Vitebsk Oblast. Do they really believe that AIDS will spare the residents of the oblast? Or perhaps they might still be living on the basis of the principle that such a thing cannot happen in their society. About the same thing is also happening in Gomel Oblast. It is still hard to break through the bureaucratic wall, which took over 70 years to build. To be sure, we prefer to ignore a problem until it becomes a crisis. The Ministry of Public Education has apparently decided to wait it out, even though a program of AIDS prevention among children, students, and youngsters was drawn up by medical personnel long ago. There's just no one to introduce it. This is despite the fact that the number of published sources with low-grade, hack-work sex information and pornography is growing with every day, and video salons are making money hand over fist by showing pornographic video films, violent sex, and other immoral movies. This is why sex education in the school and among youngsters in the risk group must occupy a special place in the propaganda activity of teachers, educators, and physicians.

Hotels, campgrounds, and dormitories in which foreign citizens reside are another major potential breeding ground of AIDS. V. P. Filonov noted that there is no AIDS information of any kind in these "points of interest." Only when representatives of the medical administration appear are posters quickly pasted up and are leaflets, brochures, and so on, printed by public health education organs, placed in the rooms. As if these are things that medical workers need and not everyone



else! Hotel administrations and their departments must absorb the experience of foreign countries, where every person taking a room is given an informative leaflet on AIDS and on preventive measures.

Unfortunately, the deputy minister went on, not all executives of oblast and republic institutions understand the threat posed by AIDS. In Gomel, for example, local authorities prohibited city transportation from carrying AIDS prevention advertisements. A specially equipped trolley bus was ordered back to the shop posthaste for repairs. There is no information available on the danger of AIDS and on preventive measures in trains, at terminals, in airports, and other public places.

It would also be desirable to discuss in this journal the relations of the press (newspapers and journals of a nonmedical profile) to AIDS information and of medical workers in observing ethics and medical confidentiality. As we know, medical personnel who betray medical confidentiality are punished in accordance with the BSSR Criminal Code by a fine of from 1,000 to 5,000 rubles or corrective labor, and forfeiture of the right to engage in medical activity. The same punishments are also foreseen in relation to correspondents who publish materials on AIDS. And if a newspaper reveals information on an HIV carrier and his contacts with other people throughout the entire republic, in this case the punishment is stiffened. Medical workers must observe the principle of doctor-patient medical confidentiality, and the press of a nonmedical profile must necessarily consult with specialists.

We will not dwell today on the pathways of AIDS infection, since much has already been written about this in our journal. Our task is to turn the attention of executives of ministries, institutions, and enterprises to the need for helping medical institutions to obtain from abroad and for hard currency the necessary laboratory complexes for quick diagnosis of HIV carriers and of AIDS patients within the republic's population, with the purpose of preventing the infection's spread.

What must be done to achieve this? First, state institutions and industrial enterprises must provide immediate assistance in satisfying the acute demand for medical instruments: scalpels, including disposable ones, dental mirrors, drills, needles, syringes and other instruments. Such medical instruments can always become sources of transmission of HIV infection, including for a minister or a director of any enterprise, since no one is insured

against disease and operations. And not everyone can come to the hospital with his own instruments, which is why a sufficient quantity of instruments must be available in medical institutions.

Second, we need to find the hard currency needed to acquire quick-analysis laboratories (11-12 laboratories) so that doctors could freely examine the republic's population and reveal people who are HIV positive. Unfortunately our enterprise directors prefer to allocate money for the acquisition of Mercedes and other foreign automobiles, rather than helping terminally ill people. After all, two laboratories can be obtained in place of a single vehicle. However, executives look at this differently: A Mercedes is worth a few AIDS cases. This is our common misfortune. Unfortunately, we forget that the people are not living for our benefit: We are living for their benefit, and we are doing everything for them, including for ourselves. We must not forget that life will force us to solve this problem one way or another, since according to the calculations of experts the outlays on treating AIDS patients in the USSR will be equal by the year 2000 to the present public health budget. The cost of just one drug for preventive treatment of one patient for a year is R60,000, and 1 kg of azidothymidine, which suppresses development of the virus (but does not kill it) costs R180,000. Without question, it is by far easier to extinguish a fire when it has just begun than after flames have engulfed the entire house. This is why medical workers must now sound the alarm in all places: in factories and plants, in institutions and VUZes; they must use intensive methods to create the structure by which to detect AIDS patients; they must implement preventive and epidemic control measures.

Everyone must know that the laboratories that are available today for detection of HIV positive individuals are working in unsanitary conditions, without the appropriate equipment and space, and that they need immediate assistance. Perhaps we should invest hard currency and our financial assets here and not in the purchase of Mercedes automobiles, and we should remind enterprise executives who possess hard currency that AIDS infects not only prostitutes and homosexuals, but also totally innocent people (through injections, at dental offices and so on), including children.

So let's help medical workers and help ourselves at the same time! Only by joint efforts will be able to surmount the "plague of the 20th century."

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**Follow-Up Cytogenetics of Exposed Chernobyl Cleanup Personnel**

927C0466A Kiev *TSITOLOGIYA I GENETIKA*  
in Russian Vol 25 No 5, Sep-Oct 91 (manuscript  
received 02 Apr 90) pp 3-9

[Article by M.A. Pilinskaya, A.M. Shemetun, D.V. Redko and S.Ye. Shepelev, All-Union Scientific Center for Radiation Medicine, USSR Academy of Medical Sciences, Kiev; UDC 576.312.32/38;612.014.482]

[Abstract] Follow-up cytogenetic studies were performed on 22 individuals involved in Chernobyl cleanup efforts to assess temporal dynamics of genetic damage. The cohort consisted of 11 subjects that had sustained radiation injuries and 11 exposed up to a 1 Gy dose of ionizing radiation without clinical symptomatology. Analysis of a total of 7950 metaphasic plates showed that in an interval ranging from 5 to 26 months the general tendency was for elimination of lymphocytes bearing aberrant chromosomes. Accordingly, these findings also underscored the difficulties in attempting one to three years later a retrospective estimation of original exposure levels. Figures 2; tables 2; references 31: 4 Russian, 27 Western.

**Mouse-Mink Hybridomas Producing Mink Immunoglobulins**

927C0466B Kiev *TSITOLOGIYA I GENETIKA*  
in Russian Vol 25 No 5, Sep-Oct 91 (manuscript  
received 15 Jun 89) pp 35-40

[Article by Ye.G. Ufimtseva and N.L. Galakhar, Irkutsk Scientific Research Antiplague Institute of Siberia and the Far East; Institute of Cytology and Genetics, Siberian Branch, USSR Academy of Sciences, Novosibirsk; UDC 575.222.7;576.382-316.7]

[Abstract] Conventional techniques were used for the construction of mouse-American mink (*Mustela vison*) hybridomas with cloning for production of mink IgG chains. Fusion of 8-azaguanine-resistant NSO mouse myeloma cells with mink splenocytes yielded a hybridoma line (10-B5) secreting one to four  $\mu\text{g/ml}/10^5$  cells per 24 hours of mink L-chains for six months with constant recloning. Thereafter, the cells reverted to morphological heterogeneity concomitantly with a decrease in L-chain production to 0.3  $\mu\text{g/ml}/10^5$  cells per 24 hours. Analysis of one such clone yielded indeterminate results in terms of mink chromosome identification. These observations indicate that four cloning stages were insufficient to ensure stable mouse-mink hybridomas. Figures 1; tables 2; references 19: 6 Russian, 13 Western.

**Hematologic Indicators in Survivors of Acute Radiation Injuries**

927C0466C Kiev *TSITOLOGIYA I GENETIKA*  
in Russian Vol 25 No 5, Sep-Oct 91 (manuscript  
received 26 Sep 90) pp 60-64

[Article by L.P. Kindzelskiy, E.A. Demina, L.L. Zlochevskaya and Ye.Ye. Chebotarev, Kiev Scientific Research Institute of Oncology; UDC 577.391.621.311.25.004.65]

[Abstract] An analysis was made of chromosomal aberrations in peripheral blood lymphocytes of Chernobyl cleanup workers in correlation with clinical manifestations of acute radiation injuries (ARI). The cohort involved 26 men with stage I ARI, five with stage II, and three with stage III. Cytogenetic studies were conducted on May 12 to June 9, 1986, i.e., two weeks from the start of the Chernobyl explosion. The percentage of abnormal cells in the three groups ranged from 5.0 to 12.5 percent, 8.5-16.0 percent, and 20.5-52.0 percent, respectively. The corresponding figures for chromosomal aberrations per 100 cells were 5.0-13.5, 8.5-20.0, and 23.0-80.5. Hematologic examination one month after irradiation showed depletion of leukocytes, granulocytes, and thrombocytes in direct relation to the severity of ARI. Concomitantly, bone marrow smears displayed an analogous relationship with respect to myelokaryocytes, blast cells, and granulocytes. Tables 2; references 6: 5 Russian, 1 Western.

**Spring Wheat Aneuploid Varieties in Studies on Genetic Regulation of Leaf Production**

927C0467E Minsk *DOKLADY AKADEMII NAUK*  
BSSR in Russian Vol 35 No 11, Nov 91 (manuscript  
received 28 May 91) pp 935-938

[Article by D.A. Dylenok, L.V. Khotyleva, acad. Beloruss. SSR Acad. Sci., and Ye.A. Khomich, Institute of Genetics and Cytology, Belorussian SSR Academy of Sciences; UDC 631.523:633.111]

[Abstract] Genetic studies were conducted on the identification of genes involved in leaf surface production at various stages of spring wheat development and maturation. The study utilized a series of monosomic lines of Opal spring wheat, bred from the standard Chinese Spring monosomic line and its derivatives, in each of which Opal cytoplasm replaced Chinese Spring cytoplasm. The resultant data indicated that genes on chromosomes 2B and 1D delay leaf development, while chromosomes 4D and 6D accelerate surface formation. Absence of chromosomes 5A and 5D delays leaf growth only in conjunction with Chinese Spring cytoplasm. These findings indicate that presence of promoter genes on chromosomes 5A, 4D, 5D, 6D, and inhibitory genes on chromosomes 2B and 1D. Consequently, leaf production has been shown to be under polygenic control involving expression of different genes at various ontogenetic stages. Figures 1; tables 1; references 6: 4 Russian, 2 Western.

**Efficacy of Lincomycin in Tick-Borne Encephalitis (TBE)**

927C0488A Moscow *KLINICHESKAYA MEDITSINA in Russian Vol 70 No 1, Jan 92 (manuscript received 28 Jun 90) pp 65-67*

[Article by V.I. Votyakov, N.P. Mishayeva, I.I. Protas, A.P. Iyerusalimskiy, A.A. Shutov, V.N. Kovalenko, N.K. Kichkildyev, T.I. Samoylova, S.A. Drakina, A.A. Zgirovskaya, Ye.V. Polovnikova, V.A. Borisov, A.V. Zotov and V.A. Semenov, Belorussian Scientific Research Institute of Epidemiology and Microbiology, Belorussian SSR Ministry of Health, Minsk; UDC 616.831-002-022.7:578.833.26]-085-332-036.8]

[Abstract] Therapeutic trials were held in Novosibirsk, Perm, Kemerovo and Irkutsk with lincomycin (LM) in the treatment of tick-borne encephalitis (TBE). The treatment group was represented by 23 men and women, 15-66 years of age, with the meningeal and meningoencephalitic form of TBE managed intramuscularly with 0.6 g of LM q. six to eight hours for five to ten days in conjunction with conventional therapy excluding immune globulin. A control group of 22 patients was treated with immune globulin having titers in the 1:80-1:160 range (3 ml q. 12 hours for three to five days; 10 patients also received 30 mg of RNase q. 4 hours, 6X). A cure was obtained in both groups with temperatures falling three to six days after start of therapy and regression of meningeal symptomatology after five to 24 days. LM was shown to be particularly effective in the early stages of TBE, but both approaches to management of TBE were observed to be equally effective and prevented paralytic complications. Importantly, in view of the shortage of specific high-titer immune antisera, this study demonstrated LM to be equipotential with immunotherapy in TBE. Tables 1; references 3: Russian.

**Combined Therapy of Recurrent Herpes With Larifan and Herpes Vaccine**

927C0488B Moscow *KLINICHESKAYA MEDITSINA in Russian Vol 70 No 1, Jan 92 (manuscript received 20 Mar 91) pp 67-70*

[Article by N.S. Potekayev, N.N. Nosik, M.A. Samgin, N.K. Kudratullayev and L.A. Lavrukhina, Chair of Skin Diseases, Moscow Medical Academy imeni I.M. Sechenov; Institute of Virology imeni D.I. Ivanovskiy, USSR Academy of Medical Sciences; UDC 616.98:578.825.11]-039.35-085.37:578.245.2]-015.2:[615.371:578.825.11]

[Abstract] Clinical trials were conducted on the efficacy of combined therapy with the interferon inducer larifan (LF) and a herpetic vaccine in the management of 32 male and female patients with herpes simplex. The patients, ranging in age from 19 to 54 years, received four subcutaneous injections of 10 mg of LF q. three days in conjunction with forearm vaccination (0.2 ml, five injections; repeated after 10 days). Treatment was started during the prodromal period or during the first

day of clinical recurrence and was effective in arresting the course of the disease within one day in 22 of the patients and within two days in the others, with one patient requiring three days. Immune monitoring showed that all patients responded with a marked rise in endogenous interferon (IF), gamma-IF, and alpha-IF. Concomitantly, cytotoxicity of natural killer cells was also significantly enhanced, further underscoring the pronounced immunostimulatory effect of the therapeutic regimen. None of the patients displayed intolerance, allergic complications, or adverse changes in hematological or biochemical indicators. Tables 1; references 10: Russian.

**Efficacy of Bioelectric Stimulation in Burns**

927C0488C Moscow *KLINICHESKAYA MEDITSINA in Russian Vol 70 No 1, Jan 92 (manuscript received 13 Mar 90) pp 86-88*

[Article by Sh.Kh. Gantsev, P. Uemak [as published], Kh.Kh. Gantseva, Sh.Z. Zagidullin and V.G. Makats, Bashir Medical Institute, Ufa; Surgical Hospital, San Antonio, USA; UDC 617-001.17-085.844]

[Abstract] A cooperative study was conducted on bioelectrostimulation management of victims of the 1989 railway gas explosion in Urman-Asha in Bashkiria, involving the staffs of Hospital No. 21 in Ufa and the Military Hospital, San Antonio, Texas. The basic purpose was to assess the efficacy of early autologous skin transplantation and bioelectric stimulation of superficial and deep (third-fourth degree) burns. Biostimulation was attained by the application of disparate thin metal plates configured to fit the wound surface to generate weak galvanic currents. The procedure entailed six to 10 applications three to four hours in duration and was measured to provide 90-370 mA currents. Analysis of the results obtained with 45 men and women, 25-70 years old, demonstrated that electrostimulation significantly enhanced healing in combination with debridement and skin grafts, attenuated pain, and limited supuration and inflammation. Tables 1.

**Management of Progressive Myopia by Umbilical Tissue Grafts**

927C0458A Moscow *VESTNIK OFTALMOLOGII in Russian Vol 107 No 6, Nov-Dec 91 (manuscript received 30 May 91) pp 18-21*

[Article by M.V. Zaykova and N.F. Molokova, Chair of Ophthalmology, Izhevsk Medical Institute; UDC 617.753.2-036.17-059]

[Abstract] Clinical trials were performed with umbilical tissue grafts for correction of progressive myopia (PM). Several umbilicoalloscleroplastic techniques were utilized for grafting 8-9 mm long transplants into recipient sclera 8-10 mm from the limbus. The cohort consisted of 144 male and female patients, 11-50 years old, with 6.0 to 20.0 diopter PM. Immediate and long-term results (six

months to three years) showed that the different techniques were equally effective and free of complications. In general, the immediate and long-term benefits were an improvement in visual acuity (by 0.04-0.2) in 25-28 percent of the patients with correction, along with an increase in the field of vision in 82 percent of the cases. Deterioration of acuity was noted in 1.78 percent cases. A key factor in precluding infectious complications was storage of the fetal tissue in 0.2 percent thymol solution with lithium chloride for up to 1.5 years. References 15: Russian.

**Electroretinogram (ERG) Patterns in Relation to Pathogenesis of Nystagmus**

927C0458B Moscow VESTNIK OFTALMOLOGII  
in Russian Vol 107 No 6, Nov-Dec 91 (manuscript  
received 01 Jul 91) pp 46-50

[Article by A.M. Shamshinova, I.L. Smolyaninova, K.A. Mats and E.L. Basova, Moscow Scientific Research

Institute of Eye Diseases imeni Gelmgolts; UDC  
617.761-009.24-092:617.735-073.97

[Abstract] An analysis was conducted on the interrelationship between ERG patterns and nystagmus. The results of studies on 174 male and female patients (five to 18 years old) with optical nystagmus readily differentiated them into two cohorts. One group was represented by patients lacking visible ophthalmoscopic evidence of pathology and normal or slightly subnormal ERGs. The other group consisted of subjects with obvious retinal pathology and correspondingly frank ERG abnormalities. The resultant data were interpreted to indicate that when normal ERG prevails nystagmus has a central origin, with moderately depressed voltage due to nystagmic amblyopia. Profound ERG deviations reflect organic changes in the retina and the importance of sensory mechanisms in the pathogenesis of nystagmus. These findings further confirm the multifactorial etiology of optical nystagmus. Figures 3; references 10: 5 Russian, 5 Western.

**Acetogenic Bacteria From Oil Fields in Tataria and Western Siberia**

927C0437D Moscow *MIKROBIOLOGIYA* in Russian Vol 61 No 2, Mar-Apr 92 (manuscript received 15 Apr 91) pp 306-315

[Article by I.A. Davydova-Charakhchyan, A.N. Mileeva, L.L. Mityushina and S.S. Belyayev, Institute of Microbiology, Russian Academy of Sciences, Moscow; UDC 550.72:579.8.017.7.(470.41+571.1)]

[Abstract] Bacteriological studies on water seams in the Romashkinskiy oil field in Tatarstan and the Mykhpayskiy field in Western Siberia led to isolation of three pure cultures producing polysaccharides and acetate on  $H_2+CO_2$  and methanol. Isolate 12036 from the Romashkinskiy field has been designated *Acetobacterium romashkovskii* sp. nov.: It is a nonsporogenic gram negative rod, obligate anaerobe, growing at 30-60°C with a temperature optimum of 37°C, a DNA GC content of 39.8 percent, and a pH optimum in the 7.0-7.5 range, tolerating pH 6.0-9.0. The isolates 417/2 and 417/5 (gram negative; 43 percent GC; 30°C opt. T; pH opt. ca. 7.4-7.8) from the Mykhpayskiy field presented a more difficult taxonomic problem. These rods could not be assigned to any of the homoacetophilic genera nor to the acetogenic *Butyribacterium* or *Peptostreptococcus* genera. Figures 6; tables 21 references 18: 1 Russian, 17 Western.

**Usefulness of Antagonistic Bacteria in Potato Disease Prevention**

927C0467C Minsk *DOKLADY AKADEMII NAUK BSSR* in Russian Vol 35 No 11, Nov 91 (manuscript received 28 Jun 91) pp 1037-1038

[Article by N.A. Dorozhkin, L.M. Novikova, S.I. Bel'skaya and I.V. Viktorchik, Institute of Experimental Botany imeni V.F. Kuprevich, Belorussian SSR Academy of Sciences; UDC 631.35:633.491]

[Abstract] Trials were conducted with 238 strains of bacterial potato pathogens isolated in Belarus for selection of strains demonstrating antagonism to other bacterial and fungal pathogens. Assays conducted in terms of lytic and growth inhibition zones in *Erwinia carotovora* v. *atroseptica*, *E. aroideae* and the fungus *Fusarium sambucinum* lawns resulted in the isolation of 12 antagonistic *Pseudomonas* and *Bacillus* species. Two species in particular appear promising for follow-up studies: *Bacillus mycoides* 683 and *Pseudomonas xanthoclora* 827 were particularly antagonistic and nonpathogenic for potatoes. In addition, *B. mycoides* 683 also inhibited *F. sambucinum*. Tables 1; references 11: 7 Russian, 4 Western.

**Preservation of Colloidal Gold-Adsorbing Bacteria**

927C0498A Kiev *MIKROBIOLOGICHESKIY ZHURNAL* in Russian Vol 54 No 2, Mar-Apr 91 (manuscript received 25 Feb 91) pp 9-15

[Article by S.V. Garbara and L.G. Stepura, Institute of Biocolloid Chemistry, Ukrainian Academy of Sciences, Kiev; UDC 579.24.262.546.59]

[Abstract] Several methods were employed for the preservation of a colloidal gold-adsorbing bacterial complex, AC-1, and its individual components (*Pseudomonas* sp., *Bacillus fastidiosus*, *B. pumilus*, *B. subtilis*). The results showed that best retention of viability and gold adsorption was shown by the association and monocultures when grown on 0.3 percent meat peptone agar and stored on slants with rubber stoppers at 4°C. After prolonged—up to two years—of storage full gold adsorbing properties were recovered after three subcultures in liquid medium with addition of 4.8 mg/L of gold monochloride to the second passage. Figures 4; tables 2; references 15: 1 Ukrainian, 12 Russian, 2 Western.

**Divalon: Efficient Biocide for Cooling Lubricants**

927C0498B Kiev *MIKROBIOLOGICHESKIY ZHURNAL* in Russian Vol 54 No 2, Mar-Apr 91 (manuscript received 14 Mar 91) pp 87-92

[Article by T.N. Turchina and V.I. Kachan, 'MASMA' Scientific Industrial Association for Limited Production Lubricants; Scientific Research and Engineering Institute of the Chemical and Oil Refinery Industries, Kiev; UDC 665.767:620.197.7]

[Abstract] Trials were conducted with the novel biocide diavalon (TU 38.5901198-90) as a suitable additive to cooling lubricants used in metalworking. Extensive laboratory trials with addition of divalon to emulsion-type (ShM; TU 38 USSR 201428-84), semisynthetic (Akvol-11; TU 38 USSR 101932-83) and synthetic (Akvol-14; TU 38 10197-84) lubricants demonstrated that divalon was effective in concentrations of 0.1-0.2 percent in preventing bacterial and fungal contamination. Field trials at factories confirmed the efficacy of divalon in controlling microbial contamination and in increasing the working life of lubricants four- to six-fold. An added advantage of divalon is that it can be used in lower concentrations than other commercial biocides (0.3 percent), thereby minimizing its impact on the physicochemical characteristics of lubricants. Tables 3; references 15: 11 Russian, 4 Western.

**Bacterial and Fungal Contamination of Cooling Lubricants**

927C0508A Kiev *MIKROBIOLOGICHESKIY ZHURNAL* in Russian Vol 54 No 1, Jan-Feb 91 (manuscript received 1 Apr 91) pp 9-16

[Article by N.N. Smirnova, R.P. Naumova and V.A. Kalaganov, KamAZ Stock Co., Naberezhnyye Chelny; Kazan State University; UDC 582.288:620.193.8]



[Abstract] Microbiological studies are conducted on cooling lubricants used in metalworking to identify biodegrading microorganisms, with particular attention accorded to hydrogen sulfide producers. Studies involved assessment of emulsion-type (Ukrinol 1M), semisynthetic (Avtokat) and synthetic (Tosol OIZ) lubricants widely used in metalworking. The level of bacterial contamination of the lubricants was on the order of  $10^7$  to  $10^8$  microbes/ml, while fungal contamination ranged from  $10^2$  to  $10^4$  cells/ml. The tabulated results showed that 18 gram positive and negative bacteria, two micro-mycetes (*Aspergillus niger*, *Penicillium chrysogenum*) and two yeasts (*Candida utilis*, *Candida* sp.). Avtokat yielded 13 bacterial isolates, one yeast and three micro-mycetes (*A. niger*, *P. chrysogenum*, *Trichoderma* sp.), and Tosol OIZ yielded three bacterial and one micro-mycete. In addition, a medium was developed giving a dark color reaction with hydrogen sulfide producing organisms of the following composition: 20.0 g/L agar, 15.0 g/L gelatine, 0.05 g/L iron citrate, 0.001 g/L ascorbic acid, and 20.0 g/L sodium thiosulfate. Identification of such producers is of key importance since hydrogen sulfide causes marked deterioration of the lubricants. Tables 3; references 19: 1 Ukrainian, 14 Russian, 4 Western.

#### Genetic Modification of Colloidal Gold-Accumulating *Bacilli*

927C0508B Kiev MIKROBIOLOGICHESKIY  
ZHURNAL in Russian Vol 54 No 1, Jan-Feb 91  
(manuscript received 3 Jul 91) pp 40-46

[Article by S.V. Garbara, Z.R. Ulberg, N.F. Ryabchenko and V.P. Kiselev, Department of Natural Dispersed Systems, Physicochemical Institute, Ukrainian Academy of Sciences, Kiev; UDC 579.263]

[Abstract] Studies on surface adsorption of colloidal gold by *bacilli* led to the identification of *Bacillus cereus* B-5039 as the most efficient species rated at 100 percent adsorption on a relative scale. Subsequent plating of *B. cereus* B-5039 on selective media resulted in the isolation of a spontaneous mutant, designated R2, with significantly improved adsorption efficiency and rifampicin resistance. Treatment with R2 with N-methyl-N-nitrosoguanidine led to isolation of a mutant also displaying streptomycin resistance identified as falling in the class of oligosporogenic pleiotropic Ospo mutants. Gold adsorption by the Ospo mutant was reduced to 10-20 percent of the control level, leading to a comparative PAGE analysis of membrane protein patterns. The results showed that adsorption of colloidal gold correlated with the presence of 70 and 100 kD proteins. Figures 2; tables 1; references 13: 11 Russian, 2 Western.

#### Metabolism of Diethylene Glycol by *Pseudomonas putida* BS-2

927C0508C Kiev MIKROBIOLOGICHESKIY  
ZHURNAL in Russian Vol 54 No 1, Jan-Feb 91  
(manuscript received 4 Apr 91) pp 61-67

[Article by S.A. Sedina, Institute of Microbiology and Virology, Ukrainian Academy of Sciences, Kiev; UDC 574.2]

[Abstract] Diethylene glycol (DG) degrading *Pseudomonas putida* BS-2 biotype B was isolated from the waste waters of a DG plant which utilized DG as the sole source of carbon. Optimum growth of the B biotype was observed at 25-26°C with maximum biomass—3.08 g/L—obtained in the presence of 20 g/L of DG. However, biotype B tolerated a DG concentration range of 1-80 g/L, with the optimum band covering 5-40 g/L. Concentrations higher than 40 g/L results in partial uncoupling of anabolic and energetic processes with greater energy expenditures directed at simply maintaining viability. Tolerance of a high level of DG by biotype B should make it a valuable adjunct in microbial water purification. Figures 2; tables 1; references 25: 1 Ukrainian, 11 Russian, 13 Western.

#### Efficiency of Microbial Methane Oxidation in Exhausted Pockets of Coal Mines

927C0508D Kiev MIKROBIOLOGICHESKIY  
ZHURNAL in Russian Vol 54 No 1, Jan-Feb 91  
(manuscript received 17 Apr 91) pp 67-73

[Article by V.I. Myakenkiy, I.K. Kurdish, V.B. Demchenko, A.P. Petukh, A.V. Shmigol and L.F. Trunov, Institutes of Geotechnical Mechanics (Dnepropetrovsk) and of Microbiology and Virology (Kiev), Ukrainian Academy of Sciences; UDC 579.841.4122]

[Abstract] An analysis was conducted on the efficacy of methanotrophic bacteria used as microbial filters for reducing methane levels in exhausted pockets of coal mines. The essential approach consisted of immobilization of the bacterial suspension on the mineral residues in such pockets. Studies at two mines in the Donbass coal fields showed that methane levels could be reduced by 47 percent in such pockets depending on the temperature and geochemical factors, and conditions under which the bacteria were cultivated. Thus, in a pocket at the Ukrainian Komsomol mine where the prevailing temperature is ca. 25°C and a humidity of 85 percent the rate of methane reduction by *Methylococcus capsulatus* proceeded at a rate of  $1.9 \text{ m}^3 \text{ min}^{-1}$ . The corresponding rate at the V.M. Bazhanov mine, where the temperature approached 40°C and a relative humidity of 98 percent was  $3.0 \text{ m}^3 \text{ min}^{-1}$  of methane. These findings demonstrated the efficacy of methylotrophic bacteria in controlling methane levels at mines, a technique that deserves further development. Figures 3; tables 2; references 13: 1 Ukrainian, 12 Russian.

#### Modulation of Physiologic Activity and Adhesiveness of Methanotrophic Bacteria by Palygorskite Clay Mineral

927C0508E Kiev MIKROBIOLOGICHESKIY  
ZHURNAL in Russian Vol 54 No 1, Jan-Feb 91  
(manuscript received 7 May 91) pp 73-78

[Article by I.K. Kurdish and N.F. Kigel, Institute of Microbiology and Virology, Ukrainian Academy of Sciences, Kiev; UDC 579.841.41.22]

[Abstract] An analysis was conducted on the impact of the clay mineral palygorskite on adhesion of methanotrophic bacteria to mineral substrates and their physiological properties. The data demonstrated that 50-500 mg/L of palygorskite (Cherkasy, Ukraine; 0.2-0.5  $\mu\text{m}$  particles, 150-300  $\text{m}^2/\text{g}$  sp. surface area) stimulated a 1.7-fold increase in methane oxidation by *Methylobacter rubra*, a 1.7-fold increase in bacterial biomass of *Methylobacter rubra*. The stimulatory effects were less pronounced with *Methylobacter capsulatus*, yielding corresponding values of 1.2- and 1.4-fold with 50-200 mg/L of palygorskite and inhibition at higher concentrations. In addition, although palygorskite increased the adhesion of *Methylobacter rubra* to glass surface and mineral matter obtained from the Ukrainian Komsomol mice in Donbass 1.4-fold at a concentration of 50-200 mg/L, it inhibited adhesion of the less hydrophobic *Methanococcus capsulatus* when its concentration reached 50 mg/L. Accordingly, these findings suggest that in certain situations palygorskite may be used in enhancing the efficacy of methanotrophic bacteria when used for removal of methane from mines. Figures 3; references 18: 14 Russian, 4 Western.

#### Immobilization Kinetics of *Methylobacter Rubra* IMV-15SH on Carriers

927C0508F Kiev MIKROBIOLOGICHESKIY  
ZHURNAL in Russian Vol 54 No 1, Jan-Feb 91  
(manuscript received 29 Dec 89) pp 79-84

[Article by V.I. Karpenko, Yu.V. Pervushin and Yu.R. Malashenko, Institute of Microbiology and Virology, Ukrainian Academy of Sciences, Kiev; UDC 579.841.41.222]

[Abstract] The importance of immobilization in biotechnology stimulated a kinetic assessment of the immobilization of *Methylobacter rubra* IMV-15SH on silochrome, coal, and barren rock from a coal mine. Information derived in this manner may find application in designing an efficient microbial-based system for removal of methane from coal mines. Studies with a flow-through column at 20-25°C with *M. rubra* obtained in the logarithmic phase of growth demonstrated that the degree of immobilization was directly dependent on the length of contact and inversely related to particle size. In addition, studies with silochrome demonstrated the importance of the chemical nature of carrier surface: After two hours of contact 25 percent of the cells were immobilized to unmodified silochrome, 35 percent to silochrome bearing aminoaryl groups, and 64 percent on silochrome carrier treated with cyanuric chloride. Mathematical analysis of the binding data yielded an equation relating immobilization efficiency to operational characteristics (cell concentration, column length, flow rate, etc.) for a system in which the immobilization time did not exceed the generation time. Figures 4; references 8: Russian.

#### Monoclonal Antibody-Based Ultrastructural Localization of *Pseudomonas Pseudomallei* Antigens

927C0508G Kiev MIKROBIOLOGICHESKIY  
ZHURNAL in Russian Vol 54 No 1, Jan-Feb 91  
(manuscript received 8 Oct 90) pp 84-89

[Article by V.I. Kapliyev, N.N. Piven and N.P. Khrapova, Volgograd Scientific Research Antiplague Institute; UDC 616.982.27-039:576.851.132]

[Abstract] The immunoperoxidase technique was combined with electron microscopy for cell surface localization of pathogenetically significant antigens 6 and 8 (AG6, AG8) of *Pseudomonas pseudomallei* using specific monoclonal antibodies. The comparative study involved *Ps. pseudomallei* 57576 expressing AG6 and AG8, *Ps. pseudomallei* 114 expressing only AG8, *Ps. pseudomallei* VPA expressing AG6, and *Ps. pseudomallei* 14-15/1 defective for both antigens. AG8 was revealed on both *Ps. pseudomallei* 57576 and 114 as a diffuse component of the glycocalyx, the ease of detection facilitated by the fact that the IgM antibody served as an efficient crosslinking agent which stabilized the hydrophilic capsule. AG6 was detected on the external surface of the cell wall of *Ps. pseudomallei* VPA, but not on *Ps. pseudomallei* 57576 where it was screened by the glycocalyx which prevented access by the specific anti-AG6 antibodies, nor on the AG6-defective strains 114 and 14-15/1. Figures 4; references 11: 4 Russian, 7 Western.

#### Site-Specific Restrictases from *Bacillus Thuringiensis* var. *Kumamotoensis*

927C0510A Moscow MOLEKULARNAYA GENETIKA,  
MIKROBIOLOGIYA I VIRUSOLOGIYA in Russian  
No 1-2, Jan-Apr 92 (manuscript received 8 Feb 91)  
pp 13-15

[Article by R.R. Azizbekyan, B.A. Rebentish, Ye.M. Netyksa, M.A. Bychkova and A.P. Bolotin, All-Union Scientific Research Institute of Genetics, Moscow; UDC 579.852.11:579.254.45:577.21]

[Abstract] Phage restriction studies with *Bacillus thuringiensis* 69-6 var. *galleriae* obtained from a Soviet collection and *B. thuringiensis* 4W1 var. *kumamotoensis* H18 obtained from BGSC (Ohio, USA) showed that plating efficiencies of phages CP-54 and CP-55 were ca. 10-fold lower in the latter case. Further investigation attributed this to two restrictases in H18 designated BtkI and BtkII, with respective target sites of 5'-CGCG-3' and 5'-GATC-3'. These sequences correspond to restriction sites of the well studied restriction enzymes FnuDII and MboI, respectively. Accordingly, *B. thuringiensis* may be regarded as a source of novel restrictases. Tables 2; references 8: 4 Russian, 4 Western.



**Virulence Reducing and Immune Response  
Altering Mutations in *Francisella Tularensis***

927C0510B Moscow MOLEKULARNAYA GENETIKA,  
MIKROBIOLOGIYA I VIRUSOLOGIYA in Russian  
No 1-2, Jan-Apr 92 (manuscript received 18 Jun 91)  
pp 23-29

[Article by G.I. Aleshkin, L.V. Komissarova, R.A. Save-  
lyeva, V.I. Zakharenko, P.Yu. Loginskiy and A.G.  
Skavronskaya, Scientific Research Institute of Epidem-  
niology and Microbiology imeni N.F. Gamaleya, USSR  
Academy of Medical Sciences, Moscow; UDC  
579.841.95:579.253.4]:579.61:[616-092:612.017.1]

[Abstract] Extensive investigations were undertaken on the  
correlation between virulence and altered antigenicity in

*Francisella tularensis holoarctica* and *F. tularensis nearac-  
tica* strains. The experimental approach utilized N-  
nitro-N-nitroso-N-guanidine induced mutants and com-  
parison with wild and vaccine strains for antibiotic  
susceptibility, susceptibility to sodium dodecylsulfate,  
immunogenicity in rabbits, pathogenicity for outbred  
mice, and antigenic assessment by Ouchterlony double  
diffusion and immunoblotting techniques. As a result,  
diminished virulence was invariable shown to be accom-  
panied by altered antigenicity and diminished immunoge-  
nicity. In part, at least, these changes were due to altered  
epitope architectonics in the various strains under study.  
To some extent these findings are reminiscent of the  
situation reported for other gram-negatives in which viru-  
lence-diminishing mutations entail alterations in mem-  
brane structures and, hence, exposure of previously  
unavailable antigenic components. Figures 3; tables 2;  
references 19: 4 Russian, 15 Western.

**Comparative Investigation of Effect of Amiridin on Learning and Memory in Old Rats Using Passive Avoidance Test**

927C0517G Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 113 No 1, Jan 92 (manuscript received 05 Aug 91) pp 43-45

[Article by Yu. V. Burov, T. N. Robakidze, and A. Ye. Voronin, All-Union Science Center for the Safety of Biologically Active Compounds; UDC 615.21:577.24]

[Abstract] The effects of amiridin (one mg/kg), tacrine (one mg/kg), and piracetam (250 mg/kg) on learning and memory were investigated in old rats (18 months) using a conditioned passive avoidance reaction test. The preparations were administered by means of intraperitoneal injection once a day for 20 days. The results demonstrated that after the treatment course was concluded the latent period of the passive avoidance reaction was considerably higher in old rats and did not differ from the passive avoidance reaction latent period in three-month old animals. The data indicated that a treatment course with any of these drugs normalizes learning and memory processes. In addition, the result is stable, lasting at least seven days (length of observation) after drug use is terminated. In conclusion, the improvement in conditioned passive avoidance reaction activity in old rats following a treatment course with amiridin, tacrine, or piracetam is accompanied by normalization of the lipid matrix in the synaptosomal membranes of the animal cerebral cortex. Figures 1; tables 1; references 11: 2 Russian, 9 Western.

**Effect of Some Phenothiazine and Dibenzazepine Derivatives on Muscarinic Cholinergic System**

927C0517I Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 113 No 1, Jan 92 (manuscript received 13 Jun 91) pp 60-62

[Article by Ye. G. Brusova, Circulatory Pharmacology Laboratory, Pharmacology Scientific Research Institute, USSR Academy of Medical Sciences; UDC 615.22.015.4.07]

[Abstract] The effect of dialkylaminoalkyl and dialkylaminoacyl group derivatives of phenothiazine and dibenzazepine and dialkylaminoacyl analogs on the muscarinic receptors of the rabbit heart and striatum and the rat brain was the subject of comparative investigation. The results showed that the most active anti-muscarinic agents were aminazin, imipramine, and chlorimipramine, with their dialkylaminoacyl analogs generally showing more affinity for the muscarinic receptors. G-512, a dialkylaminoacyl analog of aminazin, had an  $LC_{50}$  of 0.025  $\mu$ M and most actively displaced [ $^3$ H]-quinuclidinyl benzylate, a classic muscarinic receptor antagonist, from rabbit striatum muscarinic receptors. Analysis of the displacement curve for [ $^3$ H]-quinuclidinyl benzylate from the muscarinic receptors of the plasma membranes revealed that a number of dialkylaminoalkyl and dialkylaminoacyl derivatives of phenothiazine and dibenzazepine display pronounced anti-muscarinic activity. In addition, the dialkylaminoacyl derivatives as a whole have a more pronounced effect on the cholinergic M-system in comparison with the respective dialkylaminoalkyl analogs. In conclusion, the findings demonstrated that inhibition of the binding of [ $^3$ H]-quinuclidinyl benzylate with muscarinic receptors in the presence of phenothiazine is competitive. Figures 2; tables 1; references 15: 3 Russian, 12 Western.

**Electrical Activity of Bulbar Reticular Neurons After Blockage of Muscarinic Receptors on Ventral Surface of Medulla Oblongata**

927C0467D Minsk DOKLADY AKADEMII NAUK BSSR in Russian Vol 35 No 11, Nov 91 (manuscript received 28 Jun 91) pp 1045-1047

[Article by V.A. Kulchitskiy, E.G. Dedyulya and V.N. Gurin, corresp. member, Belarus. SSR Acad. Sci., Institute of Physiology, Belorussian SSR Academy of Sciences; UDC 612.828]

[Abstract] An assessment was made of the impact of blockage of muscarinic receptors in the rostral area of the ventral surface of medulla oblongata in cats on the electrical activity of bulbar reticular neurons. Monitoring of 37 reticular neurons in the ambiguous and ventrolateral nuclei of the solitary tracts before and after application of filter paper impregnated with 0.1

atropine to the target areas led to inhibition of electrical activity in 23 (62 percent) of the bulbar neurons and activation in 14 (38 percent). In the case of the former, interpulse intervals rose by 100 percent ( $p < 0.01$ ), and in the later, they fell by 41 percent ( $p < 0.05$ ). These observations demonstrated that muscarinic receptors in the rostral portion of the ventral surface are involved in modulation of bulbar reticular neurons which modulate sympathetic preganglionic neurons. Consequently, the findings provide further confirmation for acetylcholine as a neurotransmitter in this neural axis. Figures 2; references 7: 3 Russian, 4 Western.

**Modulation by Epidermal Growth Factors (EGF) and Insulin of Specific Binding of Transforming Growth Factor-B (TGF-) by NRK-49F and A-549 Cell Lines**

927C0503A Leningrad TSITOLOGIYA in Russian Vol 33 No 3, Mar 91 (manuscript received 23 Apr 90) pp 80-87

[Article by S.I. Sushelnitskiy, R.S. Stoyka and S.I. Kusen, Lvov Branch, Institute of Biochemistry, Ukrainian SSR Academy of Sciences; UDC 577.171.6:57.086.835:57.086.6]

[Abstract] Cell lines differing in susceptibility to TGF-B were used in an analysis of factors determining the biological effects of TGF-B in conjunction with other humoral biomolecules. Proliferation of NRK-49F cells (derived from normal rats' kidneys) was inhibited in vitro by TGF-B, EGF and insulin, but stimulated by TGF-B + insulin and by the TGF-B + insulin + EGF combinations. Human adenocarcinoma A-549 cells were inhibited by TGF-B, but stimulated by the other factors alone or in various combinations with TGF-B.  $K_d$  values for TGF-B binding were not affected, ranging from 24.3 to 28.7 nM for the NRK-49F line and from 27.0 to 32.7 nM for the A-549 cells. However, the number of TGF-B receptors on NRK-49F cells (49300/cell) was some 5-fold greater than on A-549 cells (9700/cell), and NRK-49F

receptors consisted predominantly of 250-350 kD complexes, whereas A-549 receptors consisted of two major 65 and 85-95 kD fractions. In addition, in the presence of the TGF-B + insulin combination the number of receptors on NRK-49F cells rose to 81,200/cell, but diminished with the other combinations. The TGF-B + insulin combination also led to an increase in binding sites on the A-549 cells to 21600/cell, while the other combinations induced less pronounced increases. Accordingly, these findings indicate that the effects of TGF-B are modulated by other humoral factors and are dependent on the concentration and type of receptors present on a tissue. Figures 2; tables 1; references 20: 2 Russian, 18 Western.

**Resistance and Capacity Functions of Cerebral Vessels When Cholinergic Mechanisms Activated**

927C0517A Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 113 No 1, Jan 92 (manuscript received 13 Mar 91) pp 3-5

[Article by A. P. Pugovkin, A. I. Artemyeva, and S. G. Lazarev, Chair of Normal Physiology, First Leningrad Medical Institute imeni I. M. Pavlov; Department of Visceral System Physiology, Experimental Medicine Institute, USSR Academy of Medical Sciences, Leningrad; UDC 612.824]

[Abstract] Changes in the resistance and capacity of cerebral vessels under conditions of general pharmacologic activation of cholinergic mechanisms and the sensitivity of these vessels to catecholamines under the same conditions were investigated in 15 acute experiments on cats by means of perfusion of a hemodynamically isolated brain. A 0.5 percent solution of phosphacol in doses of 150  $\mu$ g/kg was administered three to four times at 30 minute intervals to activate the cholinergic systems of the brain. The results showed that 30 seconds after each phosphacol injection the perfusion pressure decreased an average of 17.7 percent while the venous drainage increased by an average of 2.9 percent. It was also demonstrated that the sensitivity of cerebral arterial vessels to noradrenaline was dependent on the total dose of the previously administered phosphacol. In addition, the perfusion pressure, which was initially at 19.0 percent, dropped somewhat after one to two injections, but then surged almost two-fold in comparison with baseline after further injections. Thus, the findings show that general pharmacological suppression of cholinesterase activity decreases the resistance and capacity of cerebral vessels, as evidenced by the decrease in perfusion pressure and simultaneous increase in venous drainage. Furthermore, all parameters return to normal within 10 minutes in spite of the irreversible nature of the anticholinesterase effect of phosphacol. The results suggest perfusion pressure decreases due to neurogenic cholinergic dilation of the arterial vessels. It is also likely that the brief increase in venous drainage in response to phosphacol injection is dependent on the increase in the resistance function of venous vessels. In conclusion, the

findings suggest that the cholinergic effect on cerebral circulation may be mediated by a change in adrenergic system activity in the level of sources of innervation, the intravascular nerve apparatus, and membranes of effector cells. Figures 2; tables 1; references 16: 9 Russian, 7 Western.

### **Impact of Paradoxical Phase Sleep Deprivation on Activity of Opiate Receptors Isolated From Rat Cerebral Synaptic Membranes**

927C0517B Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 113 No 1, Jan 92 (manuscript received 18 Mar 91) pp 11-13

[Article by N. P. Taranova and G. A. Izykenova, Functional Neurochemistry Laboratory, Physiology Institute imeni I. N. Pavlov, USSR Academy of Sciences, Leningrad; UDC 612.06:612.822.1:577.112.083]

[Abstract] The properties of opiate receptors isolated from the cerebral synaptic membranes of control and paradoxical sleep phase-deprived rats (Sprague-Dowley, male, 200-220 g) were compared. The specific binding of  $^3\text{H}$ -naloxone with opiate receptors was investigated at different stages of isolation from the rat cerebral synaptic membranes. It was shown that solubilizing the synaptic membranes decreased the naloxone-binding activity of solubilized proteins by 60-70 percent, while subsequent purification with affinity chromatography steadily increased the naloxone-binding activity, both with an unspecific elutriating agent (NaCl, seven-fold increase) and with a specific elutriating agent (DAGO [Tyr-D-Ala-Gly-N-Me-Phe-Gly-ol], 6,000-fold). The data showed that following paradoxical sleep phase deprivation the naloxone-binding activity decreases in both opiate receptors in synaptic membranes (by 35 percent) and in isolated receptors (by 25-28 percent) isolated from membranes, regardless of the elution method or degree of purification. Thus, these findings confirm that opiate receptors become involved in processes of structural and functional rearrangement of synaptic membranes in extreme situations, including 24-hour paradoxical sleep phase deprivation. In conclusion, it is hypothesized that protracted sleep disturbance results in changes in the structural organization of the receptor complex due to weakening of the bonds either between subunits of the receptor complex protein or between the receptor recognition site and the GTP-binding proteins. Figures 2; tables 1; references 14: 6 Russian, 8 Western.

### **Effect of Membrane Potential on Serotonin-Induced Contraction of Smooth Muscle in Rabbit Pulmonary Artery**

927C0517C Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 113 No 1, Jan 92 (manuscript received 10 Jun 91) pp 13-16

[Article by V. A. Buryy, A. V. Gurkovskaya, N. I. Gokina, and M. F. Shuba, Neuromuscular Physiology

Department, Physiology Institute imeni A. A. Bogomolets, Ukrainian SSR Academy of Sciences, Kiev; UDC 612.734.015.31:546.41:612.215.8]

[Abstract] The nature of potential-dependent serotonin-induced contraction of smooth muscle was investigated using circular muscle bands of rabbit pulmonary artery 1-1.5 mm wide and 8-10 mm long. In addition, the sensitivity of serotonin-induced contraction to nifedipine was investigated in order to determine the involvement of this reaction of normal potential-dependent calcium channels activated by membrane depolarization. The experiments showed that only about half of the serotonin-elicited contractile response can be attributed to the activation of receptor-governed potential-insensitive calcium channels. The other half of the contraction is potential-sensitive since it is removed by hyperpolarization of the membrane. Experiments aimed at researching the nature of potential-dependent serotonin contraction when the membrane potential shifts toward depolarization revealed that there is a proportional increase in the contractile reaction to serotonin when the membrane is depolarized to a certain level. Another series of experiments in which depolarization was elicited by increasing the extracellular concentration of potassium ions from five to 15-65 mmol/l revealed that slight depolarization with 15 or 20 mmol/l increased muscle band contraction in response to serotonin by 30 and 40 percent, respectively, but further increases in potassium sharply reduced serotonin contraction. These results suggest that depolarization acts on the serotonin receptor, a part of the membrane that is common to both potential-sensitive and potential-insensitive serotonin-activated entrance of calcium. The results reveal the complex dependence of serotonin-induced smooth muscle cell contraction of the pulmonary artery on the membrane potential. In conclusion, it is hypothesized that strong depolarization of the membrane may affect the effectiveness of interaction between the serotonin molecule and the receptor. Figures 3; references 13: 5 Russian, 8 Western.

### **Impact of Intranasal Administration of Substance P on Parkinsonian Syndrome**

927C0517D Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 113 No 1, Jan 92 (manuscript received 07 Mar 91) pp 16-19

[Article by G. N. Kryzhanovskiy, V. G. Kucheryanu, L. S. Godlevskiy, and A. D. Mazarati, Nervous System General Pathology Laboratory, General Pathology and Pathological Physiology Scientific Research Institute, USSR Academy of Medical Sciences, Moscow; Odessa Medical Institute; UDC 615.361.813.2/815.41:577.175.82].032.21.036:616.858-008.6].076.9]

[Abstract] The possible inhibiting effect of intranasal administration of substance P on Parkinsonian syndrome was investigated on mongrel rats (500-600 g). Parkinsonian syndrome was induced in the animals by

means of 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (20 mg/kg, four-five days, 12 hour intervals) or reserpine (30 mg/kg) injections. Most of the rats displayed signs of Parkinsonian syndrome (oligokinesia and muscular rigidity) within four to five days of beginning the injections. The results showed that intranasal administration of substance P considerably improved motor activity in the experimental cohort within five to 10 min of administration, peaking at 30 min, with its effect lasting one to 1.5 hours. In addition, intranasal administration of substance P prompted a considerable decrease in electrical activity, the number, amplitude, and duration of paroxysmal discharges, and the frequency and amplitude of slow waves in the caudate nuclei. However, it was also shown that intraperitoneal injection of substance P in the same dosage was not as effective. In conclusion, although the mechanism of substance P's effects is vague, the results suggest that intranasal administration of substance P may be able to penetrate the blood-brain barrier and caudate nuclei to help alleviate Parkinsonian syndrome. Figures 2; tables 1; references 18: 5 Russian, 13 Western.

#### **Impact of Chronic Experimental Stress and Endogenous Opioids on Histophysiological Parameters of Thyroid**

927C0517E Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 113 No 1, Jan 92 (manuscript received 13 Feb 91) pp 33-35

[Article by R. A. Krasnoperov, V. A. Glumova, S. N. Ryashchikov, and N. E. Proshutina, Chair of Biology, Chair of Pathological Anatomy and Chair of Normal Physiology, Izhevskiy State Medical Institute; UDC 616.441-091+616.441-008.6/-02:616.45-001.1/3:616-003.725]

[Abstract] The histofunctional parameters of the thyroid during emotional stress and when systems for limiting stress are activated were investigated in 15 mongrel rabbits (2.0-2.5 kg). The first group of animals was subjected to chronic stress in the form of stimulation of the ventromedial nucleus of the hypothalamus with subthreshold electrical shock (15 one-hour sessions every other day). The second group of animals was subjected to the above stress in addition to electrical stimulation of the large raphe nuclei in the medulla oblongata, where opioid peptides are synthesized. The results show that thyroid hyperfunction in response to experimental chronic stress prompted an increase in serum  $T_3$  by 3.6-fold in the first group and 1.8-fold in the second group. In addition, morphometric analysis of the thyroid revealed a decrease in the volumetric density and the height of the epithelial lining of the adenomeres and the average volume of thyrocyte nuclei, indicating suppression or depletion of follicular epithelia. The direct correlation between parameters of vascular support of the thyroid and thyrotropin hormone suggests a vasotropic effect of the latter. The data also revealed an increase in the serum profile of thyrotropin hormone in the second group more pronounced than that of the first group.

These results indicate that increasing the level of opioid peptides in the central nervous system when the large raphe nucleus is stimulated prompts the secretion of thyrotropin hormone. Figures 2; tables 1; references 14: 10 Russian, 4 Western.

#### **Some Molecular Mechanisms of Antioxidant Effect of Dalargin on Liver Under Conditions of Experimental Cholestasis**

927C0517F Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 113 No 1, Jan 92 (manuscript received 24 Sep 90) pp 38-40

[Article by R. N. Korotkina, Ye. P. Fomchenkov, V. I. Andreyev, V. I. Smirnova, and A. A. Karelin, Biochemical Clinical Laboratory and Department of Anesthesiology and Resuscitation, Surgery Institute imeni A. V. Vishnevskiy, USSR Academy of Medical Sciences; UDC 616.36-008.811.5-092.9-02:615.23/-07]

[Abstract] The hepatoprotective antioxidant effect of dalargin (10  $\mu$ g/kg, intraperitoneal injection) was investigated against a background of naloxone administration (100  $\mu$ g/kg, intraperitoneal injection) using 144 male mongrel albino rats (200 g) with experimental cholestasis. The results demonstrated that dalargin decreases xanthine oxidase and malonic dialdehyde activity in the liver but also increases glutathione-S-transferase activity. The administration of naloxone alone decreased glutathione-S-transferase activity by 25.9 percent. It was also shown that the combined administration of dalargin and naloxone elicited no significant changes in glutathione-S-transferase activity within the first hour, but caused a considerable decrease three and five hours later. In addition, dalargin and naloxone together increased malonic dialdehyde activity in comparison to dalargin alone by 109.2, 80.7, and 25.7 percent, one, three, and five hours later, respectively. These data show that treatment with naloxone and the subsequent administration of dalargin attenuate the antioxidant effect of the neuropeptide to a considerable degree. Furthermore, the antioxidant effect of dalargin is attributed to the fact that dalargin is a structural leu-enkephalin analog, and by competing with the latter, it forces the latter from the tissue, causing an increase in the leu-enkephalin in the liver tissue. In conclusion, since the opioid antioxidant naloxone completely binds with the nerve tissue of opiate receptors, thus obstructing the effect of the opioids, the observed decrease in the antioxidant effect of dalargin on the liver suggests the opiate nature of the hepatoprotective effect of this neuropeptide. Figures 2; references 13: 9 Russian, 4 Western.

#### **Effect of GABA-Lytic Induced Seizures on Binding of $^3$ H-Muscimol and $^3$ H-Diazepam in Rat Striatum**

927C0517H Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 113 No 1, Jan 92 (manuscript received 18 Mar 91) pp 52-53

[Article by G. A. Sofronov and A. I. Golovko, Army Medicine Academy imeni S. M. Kirov, Leningrad; UDC 616.8-009.24:615.217]-092.9]



[Abstract] Changes in the GABA-benzodiazepine receptor complex induced by the GABA-lytics picrotoxin and bicuculline (8 mg/kg each, intraperitoneal injection) were investigated in albino male rats (170-220 g). The results indicate that specific binding sites for  $^3\text{H}$ -GABA and  $^3\text{H}$ -muscimol react more strongly to bicuculline than to picrotoxin. Experiments on the specific binding of  $^3\text{H}$ -diazepam revealed an 86 percent decrease in the receptor affinity for diazepam after bicuculline was used to induce seizures. Other data indicate an increase in the concentration of  $^3\text{H}$ -diazepam binding sites in the rat striatum in response to GABA-lytic induced seizures. Bicuculline was also shown to reduce the affinity of benzodiazepam receptors for the ligand. In conclusion, bicuculline-induced seizures are accompanied by an increase in the affinity of GABA<sub>A</sub>-receptors for  $^3\text{H}$ -muscimol, a GABA agonist. These changes may suggest compensatory changes in the GABA-ergic systems of the rat striatum in response to GABA-lytic intoxication. Tables 1; references 11: 3 Russian, 8 Western.

#### Immunocorrecting Properties of Antibiotics in Secondary Immunodeficiency

927C0517J Moscow BYULLETen EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 113 No 1, Jan 92 (manuscript received 03 Jul 91) pp 62-64

[Article by R. V. Petrov, V. S. Aprikyan, and A. A. Mikhaylova, Immunology Department, Bioorganic Chemistry Institute imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow; UDC 612.017.1:612.112.94:615.276.4-063]

[Abstract] The effect of two main groups of antibiotics, betalactams (penicillin) and aminoglycosides (streptomycin and gentamicin), following a single injection in a wide range of doses (0.5-500,000 U/kg) was investigated on CBAXC57BL/6J F<sub>1</sub> mice with cyclophosphane-induced (0.05 g/kg for three days) immune deficiency. The antibiotics were administered after the last injection of the cytostatic cyclophosphane. The results showed

that the antibiotics exert their pronounced immunocorrecting properties when used in sub-bactericidal/sub-therapeutic doses in both humoral and cellular immunity. In addition, it was found that penicillin and streptomycin have a synergistic effect when used together, but only in sub-bactericidal doses. In conclusion, analysis of the immunopharmacological parameters of the immunocorrecting effect of the antibiotics indicates that streptomycin and gentamicin affect the humoral response to a greater degree, while penicillin affects the cellular immune response to a greater degree. Figures 3; references 8: 4 Russian, 4 Western.

#### Effect of Phytoadaptogens on Biorhythms of Dog Hemostasis

927C0517K Moscow BYULLETen EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 113 No 1, Jan 92 (manuscript received 24 May 91) pp 87-89

[Article by L. G. Khetagorova and Yu. A. Romanov, Chair of Pathological Physiology, North Osetinskiy Medical Institute, Vladikavkaz; Chair of Biology, MBF [as published], Second Moscow Medical Institute imeni N. I. Pirogov; UDC 616-005.2+612.013.7+577.3]

[Abstract] The circadian rhythms of hemostasis indexes and the effect of *Eleutherococcus* and licorice repeatedly injected on the former were investigated in 20 purebred and mongrel dogs in wintertime. Ten dogs were fed a liquid *Eleutherococcus* extract, 1.5 ml/10 kg, and 10 were given a 10 percent decoction of Caucasian licorice, 25 ml/kg. Results of group chronoanalysis showed that long-term use of phytoadaptogens did not significantly alter the biorhythm periods of electrocoagulogram indexes. However, *Eleutherococcus* administered in the morning acts as a hypocoagulant on the canine hemostasis system, while the licorice exerts a weak hypercoagulating effect. In conclusion, the data suggest that the temporal organization of the hemostasis system is characterized by chronosensitivity to the phytoadaptogens *Eleutherococcus* and licorice, which is important to evaluating their chronopharmacological properties and prospects for use. Tables 3; references 17: 13 Russian, 4 Western.

**Guidelines for Organizing Medical Care in Cases of Accidents at Chemically Hazardous Kazakhstan Enterprises**

927C0471A Alma-Ata ZDRAVOOKHRANENIYE  
KAZAKHSTANA in Russian No 2, Feb 92 (signed to  
press 1 Feb 92) pp 8-10

[Article by N. A. Melnikova and A. I. Kardashevskiy,  
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[Text] The national economy of Kazakhstan, including its chemical industry, comprises a considerable number of facilities that produce or utilize potent toxic agents (PTA). Such enterprises are sources of a constant danger of accidents with emission of PTA and mass harm to people. A similar hazard exists on railroads and stations where trains with dozens of cars and tanks of PTA pass or are formed.

Promptness and, consequently, efficacy of medical care to PTA victims are determined to a considerable extent by the speed with which information about an occurring hazardous situation is relayed. Establishment at enterprises of a system of monitoring levels of chemicals in the air and of giving notification about an accident is a duty of theirs. But, as a rule, they do not resolve these problems fully. Medical workers must make inquiries about such matters in order to determine whether producers and the public in their vicinity will have time to take the necessary protective steps (the number of casualties will depend on this) and whether the medical workers themselves will be able to promptly begin to render care to victims.

In the case of a local accident at an enterprise, first aid to victims at the site and their removal from the contaminated zone are effected along the lines of self- and mutual help, as well as by gas-rescue units, on-site rescue teams, medical teams or medical units of the on-duty shift. Existing regulatory documents are offered for such tactics. However, there are no provisions for sending any medical personnel to the site<sup>1</sup>.

In fact, the situation is different: It is only at enterprises with high productivity and use of PTA that special rescue teams are provided as part of the regular staff. Small facilities presenting a chemical hazard do not have such units at all, whereas the on-site rescue units are not sufficiently organized or equipped, i.e., one cannot rely on the help of rescuers.

In the light of the increased economic problems, enterprises ceased to devote attention to formation, outfitting, and training of medical brigades. This is why, at the present time, victims would be virtually deprived of medical care in case of an accident before hazardous concentrations are lowered. This could be avoided by establishing an accident-rescue service, the personnel of which could be trained in first aid.

Another way to solve this problem is to enable first and specialized medical brigades to work at the site. Thus far, brigades are the only realistic force capable of offering rapid aid to victims. This was confirmed during eradication of sequelae of accidents and disasters in recent years, including those in Kazakhstan. But at the present time, the personnel of such brigades have not been provided with protective insulating gear, other than specialized toxicological equipment, since the same regulatory documents provide for their work beyond the contaminated zone, at the boundary of a site, although the latter concept is quite arbitrary with respect to extraordinary situations with formation of a contaminated cloud. It is not by chance that a draft of a statute of emergency medical care service submitted for examination includes matters of mandatory equipment and social protection of medical workers: payment for working at PTA sites, compensation in case of disability or death while performing their duties, housing benefits, etc.

In this republic, decrees have been adopted and orders issued to establish an emergency medical service, but they do not yet have appropriate funding, and implementation is proceeding with great difficulty. Still, in some oblasts, acquisition of isolating gas masks for brigade personnel has begun, as well as furnishing them with special kits. In this way, it is planned to expand the range of activities of emergency medical service brigades even before hazardous PTA concentrations are lowered: They can operate both at a localized site and over a considerable part of the city in the case of a general accident (medical reconnaissance, servicing house calls, rendering aid to individual victims on the street and evacuating them from the site).

After hazardous concentrations are lowered, in the case of a large number of victims in a city, it is planned to draw upon additional manpower and resources to assist the brigades: —to render primary medical care—medical squads [of women], students, and the public along the lines of mutual help in the course of door-to-door rounds to find victims and deliver them to assembly points;—to effect triage and render urgent care in medical institutions or at victim assembly points—district polyclinic physicians and brigades of physicians and nurses to reinforce them;—to render specialized care at hospitals—physicians of existing and newly deployed hospitals.

In the event of inclusion of medical institutions in a zone of possible contamination, the plans for personnel and patient protection depend primarily on location in relation to the hazardous factor, and time of approach of a contaminated cloud. Unfortunately, not only enterprises of the Ministry of Agriculture and municipal housing service, which use ammonia and chlorine, but also those of the chemical industry in 11 cities of Kazakhstan are situated within or near the built-up zone. It would take a few minutes or tens of minutes for the PTA cloud to reach some hospitals. In such cases, evacuation is inapplicable: The accident develops rapidly, it is impossible



to remove patients on foot, while use of transport would require much time. The most realistic means of protecting personnel and patients under such conditions is to seal all rooms of the medical institution with use of gas masks and dressing soaked in neutralizing solutions. It is planned to make all of the possible preparations for sealing well in advance, with elaboration of a plan for this and a chart, designating individuals to be in charge and providing a stock of the required amounts of materials. In such medical institutions, it is best to store gas masks of appropriate sizes for personnel at the work places. Administrative departments could monitor storage and prompt replacement. Such a procedure is already practiced in medical institutions of some Kazakhstan cities and has proved itself well. And this is understandable: A special psychological set develops in the inhabitants of cities with chemical installations, and they are aware of the potential hazard. This is also attributable to the appropriate training offered by medical personnel, and for this reason all steps aimed at saving lives and health are accepted by the public with understanding.

In Kazakhstan, as in several other parts of the nation, there is a constant shortage of toxicologists. In order to fill this gap, physicians in other fields are trained in toxicological departments in urgent and specialized care in case of PTA accidents; there is mandatory inclusion of physicians of rural medical institutions, with their assignment to city hospitals as reinforcement if a critical situation arises.

Of course, such training is a forced and inadequately effective measure. This problem should be solved in a more radical fashion: Medical schools should devote special attention to the training of specialists; they should organize on a broader basis the advanced training of toxicologists and publish more literature on relevant subjects.

At the present time, the toxicological departments of the republic's hospitals are not strong enough, and they are usually found only in oblast centers. Considering the specifics of development of industry in Kazakhstan, and the complexity of the ecological situation, one should organize large toxicological departments in different regions, particularly since conditions exist for establishing them. For example, there is a major barocenter and toxicology department in Chimkent and the emergency care hospital.

Such are the general features of the main directions of work of the republic's health-care service for the prevention and eradication of consequences of possible accidents in the chemical industry.

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#### Kazakhstan Folk Medicine Center

927C0471B Alma-Ata ZDRAVOOKHRANENIYE  
KAZAKHSTANA in Russian No 2, Feb 92 (signed to  
press 1 Feb 92) pp 47-49

[Article by A. I. Izmalkov, Health Ministry of the Republic of Kazakhstan Alma-Ata, under the rubric "Economy and Management": "Republic Center for Folk Medicine"; UDC 615.89]

[Text]The methods of traditional folk medicine have many centuries of experience. No one questions this historical fact. Healers of different peoples and ranks gathered, crumb by crumb, everything that helped people with various diseases, trauma, and parturition. This original know-how became richer in time, creating professional healers. The most valuable part of their skills and abilities was subsequently used by scientific medicine. It included drugs derived from the plant and animal kingdoms. For example, ginseng and velvet antlers, from the young axis deer, have been included in the bank of official medicine as healing agents that have been tested through the ages. The same can be said about opium, hashish, wadded cotton ["moksa"], and acupuncture—unique methods for anesthesia in surgery, cauterization, using needles on nerve endings, which came from China to the modern physician.

That medicine also included amulets, incantations, exorcism, and various rituals originating in the gray depth of centuries. Later, our modern consciousness, which is not without a particular arrogance related to selectivity of view on history, qualified them as mysticism, and even a tinge of senselessness. But why, why then have the therapeutic rituals, with all their seeming absurdity, lasted in the for almost the entire history of human life?

At present, we are glancing through the back door into the life of thousands of simple people. It is time to stop burning all bridges behind us and break the ties of time. It is time to get wiser. After all, life exists in spite of our attitudes. We now need to have private conversations both with ourselves and with others. At present, it is no longer honest people, but conservatives grasping for the old times that are convenient for them, who are going against the current.

However, let us return to rituals and healing incantations. Perhaps it is time to abandon the disdainful and ironic attitude toward them. It is not positive knowledge, but faith that is the basis of successful magic. Our duty is to help it acquire courage and to enter with confidence into the splendid temple of scientific healing. Faith, trance, magic—all this is a special form of psychophysiological state that corresponds to "being" on a different

level of reality. All this requires some reflection, as do the following concepts that have penetrated into our lives in recent times: extrasensory, bioenergetics, and cosmobiology. These concepts have their own adherents with theoretical and practical skills. The purpose of their work is to prevent disease and provide medical rehabilitation of people by means of extrasensory factors, contact and contact-free massage, as well as oriental methods of strengthening health and other means used in folk medicine.

A conference on the topic of "Natural scientific and sociocultural bases of cosmic thinking" convened in Moscow in August 1989. Representatives of the International Association for Investigation of Psychotronics and Juvenology, Multipolar Relations in Mathematics, Physics, Chemistry and Biology participated actively in its work. At this conference it was decided to form a regional center of the federation of extrasensory, bioenergetics, cosmobiologists, sociologists, and psychologists as part of the Sozidaniye [Creation] Association with an administrative board in Alma-Ata.

A year-and-a-half ago, a folk medicine center was opened, on a cost-accounting basis, in the capital of Kazakhstan. The Kazakh Ministry of Health was the initiator of its opening. It was expected to revive in this center the methods of traditional healing, to unite folk healers scattered over Kazakhstan, and to expand the area of paid medical services. However, in its first year, implementation of the ideas advanced with difficulty at the center. Only five of the 65 employees at the center could be classified as folk healers. There was chaos in the registration office, with only one person handling the file cards, while there were 200-250 patients per day seeking medical attention. There were no departments at the center, and 70 percent of its funding was spent on wages. Yet the funds were not very sizable: The income of the center constituted about 60,000 rubles per month.

Six months ago, a very different person came to head the center. We refer to Ye. A. Abylkasymov, candidate of medical sciences, who had graduated from the history department of the university and later from a medical institute. He graduated with honors from both. His prior jobs were as chief of the economic planning board of the Kazakh Ministry of Health, chief physician of the first paid polyclinic in Alma-Ata which provided the government with an income of 2 million rubles. There was a time when he wanted to be Kazakhstan's first "collective owner," i.e., to rent a polyclinic on time, to be paid for in 5 years, which he would head. But bureaucrats and their shaggy conservatism hindered this.

The energy of Ye. A. Abylkasymov in the new center was most timely. There was an open field that had to be mowed! At first he had to find folk healers, determine their capabilities, then establish folk medicine centers in Kazakhstan, and then carry out work to integrate folk and scientific medicine.

The first two tasks were carried out in short order. The third requires time. The following departments became operative at the center: internal medicine, surgery, gynecology, rehabilitation, diagnostic, phytotherapy and homeopathy. It was the intent to have the above departments help folk healers arrive at the correct diagnosis. In a department, it is easier to observe how they heal, provide them with further theoretical and clinical training; it is easier to adopt the wise methods and resources of folk medicine in scientific medicine. To date, more than 100 candidates for the title of folk healer have undergone a check. Of this number a special commission of the Kazakh Ministry of Health gave positive certification to 57. The title of folk healer is conferred for two years. This period of time is needed by local health care agencies and institutions to carry out comprehensive observation of the results of the clinical work of a particular healer. If his performance is good, he is recertified for the next term.

All folk healers work under the supervision of medical specialists. A clinical diagnostic laboratory was organized at the center, as well as endoscopy, ultrasound testing, electrocardiography, rheography, laser therapy and reflexotherapy, physiotherapy, therapeutic physical culture and massage rooms. Physicians with scientific degrees and scientific titles in the fields of therapy, pediatrics, neurology, psychiatry, gynecology, phytotherapy, homeopathy, etc., see patients for consultations. The best folk healers of Kazakhstan and leading specialists of formal medicine have joined forces at the center. In the last decade, there has been a dramatic increase in number of patients with functional, psychophysiological disturbances and drug disease in Kazakhstan. Side-effects, pathological processes of viral and bacterial etiology change to a chronic form, many diseases are striking younger people, and preconditions for organic pathology arise from intake of agents of chemical origin. All this affects people's work capacity. We are faced with enormous social and economic losses. As shown by the experience of the center, methods of folk and nontraditional medicine have a considerably greater effect than those of classical medicine. There, the patient gets rid of autoallergens and junk. He takes plant products which have been used by the people for many centuries. He is subject to bioenergetic and homeopathic effects; therapeutic exercise and balneotherapy, spot and manual massage are offered to him.

We must return once more to bioenergetics. In recent years, some scientists, who have theoretically validated and found the means of generating nontraditional forms of energy on a physical-instrument basis, are convinced that the extrasensory type of rehabilitation of patients will take a leading place in clinical medicine. Incidentally, there are quite a few people living in Alma-Ata who have bioenergetic and vibration activity, which was discussed in 1989, at the International Symposium on Untraditional Methods of Treating Biological Objects. However, there must be development of methods of testing and certifying such individuals, so that swindlers

and charlatans can be excluded. In essence, this is one of the chief concerns of the center that tests such people. After this, the patient's opinion will be of exceptional importance.

Some good reports are being sent by patients to the bioenergetics specialist and clairvoyant R. Amanzholova and Zh. Zhakupova who practices spot massage, therapeutic physical culture, and herb medicine. S. Bekenova and S. Kunanova have had good results. The former uses bioenergetics and religious treatment methods and the latter, bioenergetics, spot massage, clairvoyance, and fortune telling. There are already known folk healers in different oblasts who were given their "travel pass" by the center: A. Paluanova in Kzyl-Orda, A. Amzeyeva in Aktyubinsk, T. Imenova at Zharma settlement in Semipalatinsk Oblast, M. Aydarov in Kentau, B. Mynbayev in Dzhambul, I. Karabayev in Arkalyk, N. Karipova in the village of Bakanas in Alma-Ata Oblast, Kh. Khasanova in Inderskiy Rayon of Guryev Oblast, N. Soboleva and Yu. Shtukkert in Ust-Kamenogorsk, B. Levshin in Kustanay, O. Shikova in Pavlodar, S. Beriye in Karaganda, and T. Nurmetov in Bolshenarymskiy Rayon of East Kazakhstan Oblast.

In conclusion, it should be stated that the monetary income of the center has grown, as compared to the first months after it was opened. The annual income is in the range of 200,000 to 250,000 rubles. Patient who come here are desperate and have lost faith in formal medicine. They receive the most open welcome here; there is a well-equipped pharmacy and 25-bed boarding house for visitors. Everything is for the patient, everything with a plus. But there is also a disturbing minus. We refer to cost accounting from the patient's pocket—for now. In the future, the staff of the center believes that medical insurance companies and enterprises where patients are employed should pay for medical care, rather than the patients. I wonder when this will come about. When?

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### **The Role of Teaching Military Medical Disciplines in the System of General Training of Physicians**

927C0471C *Alma-Ata ZDRAVOOKHRANENIYE KAZAKHSTANA in Russian No 2, Feb 92 (signed to press 1 Feb 92) pp 50-52*

[Article by O. F. Pakhunov and V. A. Breydo, Military Department of Karaganda Medical Institute, under the rubric "Medical Education"; UDC 356.33:371.3]

[Text] Investigation of disaster medicine plays an important part in optimizing the teaching process. In-depth knowledge of matters of organization and tactics of the medical service, military surgery in the field, military treatment in the field, military toxicology and medical protection helps apply this knowledge to eradicate the sequelae of accidents and disasters.

Experience of recent years has shown that there are close links and relations between disaster medicine and military medicine. The know-how gained during the Great Patriotic War, in Afghanistan, and other military conflicts with respect to organizing medical care of the wounded and sick serves both military and disaster medicine well. Participation of military medical services in eradication of the consequences of disasters and accidents provides vast material for the practice of military medicine.

Clinical classes in military toxicology draw parallels in onset of sites of accidents and disasters in both our country and abroad, where situations arose involving chemical and radiation injury to the public in peacetime.

In accidents related to fires, the symptomatology of burns is aggravated by the combined effects of carbon monoxide and various oxides of highly toxic agents (phosgene, cyanide). In extreme situations, considerable amounts of toxic agents could be emitted into the environment from enterprises, particularly those that produce toxic chemicals, and organophosphorus compounds, chlorine, ammonia and others could appear. They can induce the clinical signs of poisoning analogous to those resulting from exposure to toxic agents that induce neuromyopathy and asphyxia. For this reason, we are trying to develop ecological alertness in our students; we devote attention to their moral and psychological training for appropriate actions to save victims and render urgent medical care in such situations.

Models of symptomatology of effects of toxic agents are reconstructed in animals. Students observe development of clinical signs as related to severity of injury; they keep logs of experiments and play the part of health instructor or physician in organizing and rendering medical care at the site of a chemical accident or in a combat situation, as well as disasters; they give the animals antidotes and symptomatic therapy. Bringing animals out of a serious condition, carrying out resuscitation procedures on their own in case of exposure to toxic agents are particularly demonstrative.

When discussing situations at a persistent and fast-acting site of organophosphorus toxic agents, the students' attention is focused on the fact that casualties are formed within a short-period of time. First aid must be rendered immediately, since evacuation of serious casualties in one trip diminishes the capacity of vehicles, while those who are not evacuated would require urgent medical attention, etc.

Such situations can also arise in cases of accidents. Toxicological and clinical distinctions of chemical accidents determine the specificity of organizing therapeutic care, the main purpose of which is to save lives. The symptomatology of injuries due to toxic agents with neuromyopathy and asphyxia action, and carbon monoxide is demonstrated to students in animal experiments, since it is not uncommon for the practicing physician to encounter the deleterious effects of these

groups of substances. It is important for the student to learn that the scope of care, and resuscitation measures in such a situation are the same as for analogous injuries caused by chemical warfare. For example, the future physician will have occasion to encounter carbon monoxide poisoning not only in wartime, but in his routine practice, particularly when there are accidents and fires.

The results of our scientific observations are a mandatory part of the educational process and practice. For example, a model of chronic carbon monoxide poisoning was reproduced in experiments with rats. Members of the student science club study exposure to carbon monoxide and its effect on drivers and passengers of city buses. They immediately played the role of physicians, rendering first aid and carrying out resuscitation maneuvers as a practical class. This made it possible to test their skill in using oxygen equipment and ability to identify the different types of hypoxia.

In the course of the practical classes, much attention is devoted to acquiring skill in assessing the radiation situation in the interests of the medical service, in various accident situations, disasters, as well as combat. They study dosimetric instruments. Students learn to determine independently whether radioactive substances are present on the body or incorporated. On the basis of the data they obtain, they develop the tactics for rendering first aid and treating victims. To reinforce their knowledge, the students solve situational problems and make decisions concerning medical protection.

Medical protection against factors that arise in case of accidents in atomic energy installations and the chemical industry is covered in the study of protection against weapons of mass destruction. Using the Chernobyl accident as an example, they work on the problem of anti-radiation treatment. Students look for means of decontaminating an area as related to its radiation level.

Cases from clinical health care described by the instructor also help expand the range of vision of the student and increase his interest in the subject. Students learn about the organic special-purpose medical detachments formed in the medical service of the Armed

Forces to render care at the sites of disasters and accidents. Concrete examples are used to demonstrate that the student can acquire the knowledge needed by a well-educated physician in a military department. In the course of the educational and training process, we strive to develop a conscientious attitude in the student toward military training and an understanding of the importance and necessity of gaining professional military knowledge and to inculcate positive motivation for learning. For this purpose, cases are cited from the experience of the military medical service during the Great Patriotic War, in Afghanistan, medical care of wounded and sick in extraordinary peacetime situations.

Development in the student of skill in scientific thinking and research is a mandatory prerequisite for the future military physician. The military [medicine] department staff constantly introduces new progressing teaching methods to the educational process. Student research is viewed as the most effective form of problem teaching which is aimed at active and independent acquisition of knowledge, rather than passive perception. Students carry out research both during school hours and when there are no classes. During class hours, they participate in research, solve situational problems and game problems, and deliver abstracts of reports. Prior to the experiments, they demonstrated a level of basic knowledge that conformed to the requirements. Extracurricular research includes the study of additional literature and preparation of materials for topical conferences, summary military-theoretical student conferences, meetings of the student club, and manufacture of training equipment and visual aids.

It is known that a student enrolled in a military department acquires organizational and practical skills, he learns to discern the international situation and life in his country, he is able to rapidly evaluate a situation developing in peacetime and wartime, and to take immediate steps to help the wounded, sick, and casualties in accident situations. A physician who has gone through military medical training develops the will of a commander, which is essential to both a military physician and one practicing in the health care system.

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**Dangers of Radioactive Clouds**

927C0462A Moscow *ATOMNAYA ENERGIYA*  
in Russian Vol 71 No 1, Jul 91 (manuscript received  
10 Oct 90) pp 43-48

[Article by B.G. Pologikh and Ye.V. Kazyuchits, Institute of Atomic Energy imeni I.V. Kurchatov; UDC 621.039.58]

[Abstract] A mathematical analysis was conducted on putative radiation loads sustained by populations in the vicinity of a nuclear accident or disaster, using the hypothetical situation of an accident aboard a nuclear-powered ship in a commercial harbor. Tabulated calculations showed that, as expected, irradiation from respiratory exposure poses a greater hazard than cutaneous exposure. Irradiation of bony tissue from radionuclide accumulation, for example, exceeds skin irradiation 1000-fold even in the most extreme cases of external contamination. Reactors utilizing moderately enriched uranium are expected to release Pu-239, Pu-240, Pu-241, and Cm-244 radionuclides, which constitute the primary respiratory hazards. Use of highly enriched uranium entails release of volatile I-131, I-133, I-135, Ce-144, Cs-134, Cs-137, Zr-95, Y-91 and Ba-140 radionuclides. In the latter case the thyroid is one of the primary targets due to the iodine isotopes. Tables 4; references 2; Russian.

**Radiation Monitoring in Residential Areas**

927C0462B Moscow *ATOMNAYA ENERGIYA*  
in Russian Vol 71 No 1, Jul 91 (manuscript received  
17 Aug 90) pp 48-56

[Article by V.V. Matveyev, B.V. Polenov, N.V. Ryabov and K.N. Stas, SNIIP [expansion unknown]; UDC 621.002.56.53.0,84.531.7,681.2]

[Abstract] In response to the Chernobyl disaster in 1986, the Soviet government has implemented in the middle of 1989 an expanded program developed at the National Commission for Radiation Safety for radiation monitoring. The program anticipates extensive citizen participation in health safety monitoring for a dosimetric assessment of background levels in at-risk areas and prevention of excessive exposures. Accordingly, this program encourages gamma and beta radiation surveys of residential facilities, work areas, schools, foodstuffs, and so forth. To facilitate such efforts measures have been taken to increase production and availability of state-of-the-art personal monitors and detection devices combining low prices and ease of use with reliability and requisite sensitivity. Figures 5; tables 3; references 9; Russian.

**Audiometric and Dynamic Impedometric Studies on Exposed Chernobyl Cleanup Personnel**

927C0467A Moscow *VESTNIK OTORINOLARINGOLOGII*  
in Russian No 1, Jan-Feb 92 (manuscript received 25 Apr 90)  
pp 11-14

[Article by D.I. Zabolotnyy, T.V. Shidlovskaya, N.S. Mishchanchuk and A.I. Kotov, Kiev Scientific Research Institute of Otolaryngology imeni Prof. A.I. Kolomiychenko; UDC 616.28-008.1-02:614.876]-07]

[Abstract] Audiometric and dynamic impedometric follow-up studies were performed on 251 male Chernobyl cleanup workers ranging in age from 23 to 50 years. The subjects had received whole-body radiation exposures of 0.25 to 2.0 Gy; excluded from the study were individuals with an anamnesis of auditory disorders or head injuries. Tinnitus was reported by 145 (57.8 percent) of the subjects, while 106 (42.2 percent) were observed to have difficulties with speech perception. The latter category consisted of 79 patients in whom auditory threshold was raised by ca. 45.2 db at high frequencies (3000-8000 Hz) and 27 with increases of 35.1 dB at 125-2000 Hz and 65.0 dB at 3000-8000 Hz. In each case hearing impairment was directly related to degree of exposure. Dynamic impedometry with ipsilateral and contralateral stimulation disclosed imbalance between excitatory and inhibitory coupling at the nuclear and internuclear levels in the acoustic reflex arc. These findings indicate that auditory adaption is impaired even in subjects who have retained "normal" hearing. Tables 2; references 15: 11 Russian, 4 Western.

**Lead Pollution Patterns in Minsk**

927C0467B Minsk *DOKLADY AKADEMII NAUK BSSR*  
in Russian Vol 35 No 11, Nov 91 (manuscript  
received 13 May 91) pp 1013-1017

[Article by N.I. Ignatenko and V.P. Kolnenkov, Institute of Geochemistry and Geophysics, Belorussian SSR Academy of Sciences; UDC 550.4:796(476)]

[Abstract] Using Minsk as a model for industrial cities, industrial lead pollution was assessed in local soil samples, river and lake sediments, and aerosol samples. The results led to the formulation of a triangular diagram and an equation relating mobile, adsorbed, and silicate forms of lead pollutants. The data demonstrated that in most situations lead emitted by industrial plants exists in highly mobile and adsorbed forms and, thus, differs markedly from natural background lead which exists largely in poorly mobile forms. Accordingly, industrially released lead represents a significant risk factor for contamination of the food chain. Figures 1; tables 2; references 9; Russian.

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